Oct. 5, 1937. E. L. SMITH ET AL 2,095,104

WRAPPING MACHINE

Filed Oct. 1, 1935 4 Sheets-Sheet 1

Fig. 1.

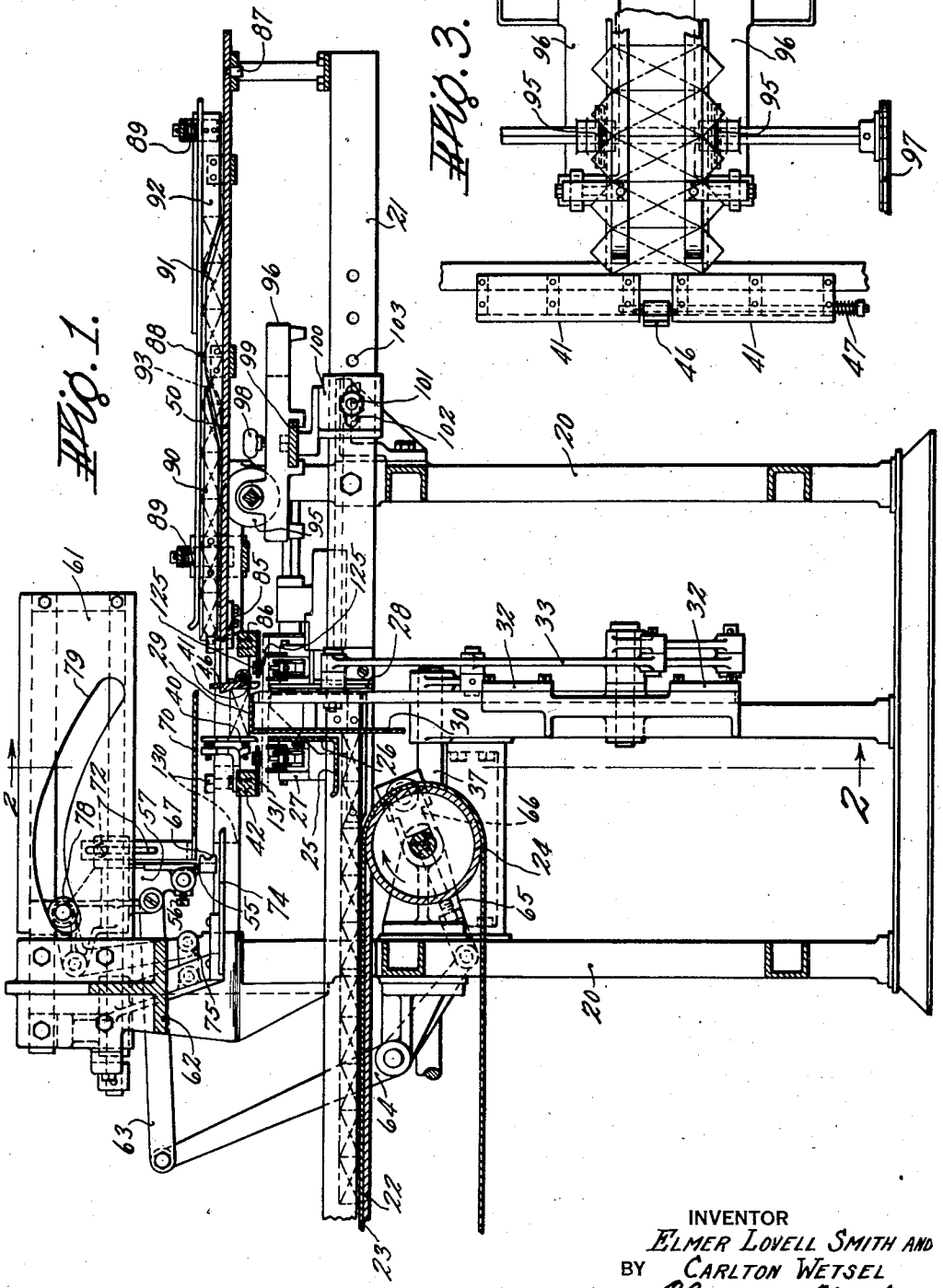


Fig. 3.

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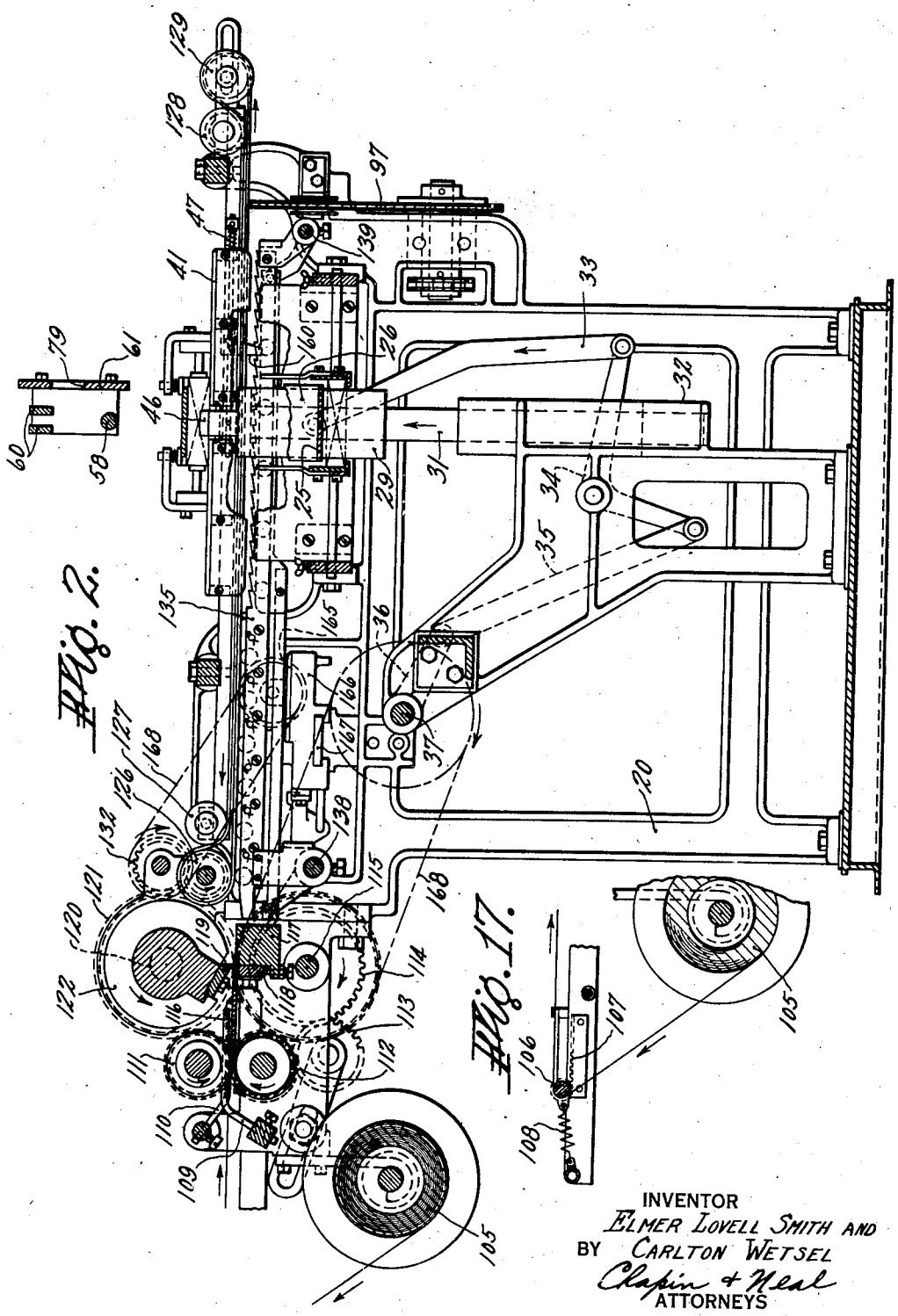


Fig. 2.

Fig. 17.

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Fig. 4.

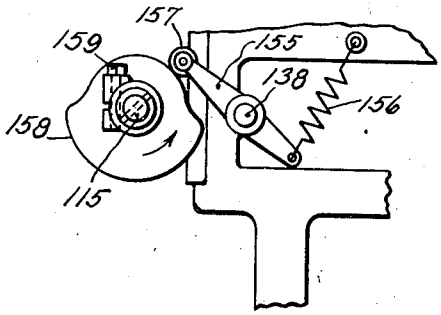


Fig. 5.

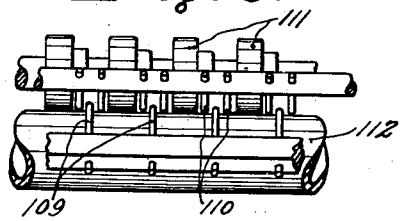


Fig. 7.

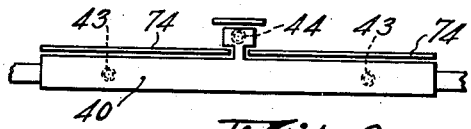


Fig. 6.

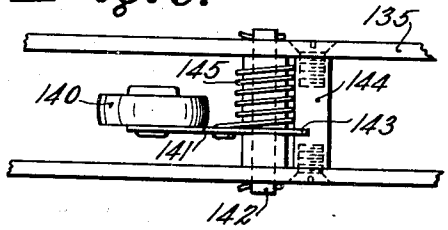


Fig. 8.

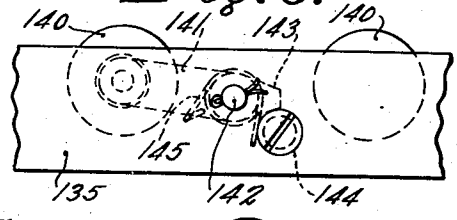


Fig. 9.

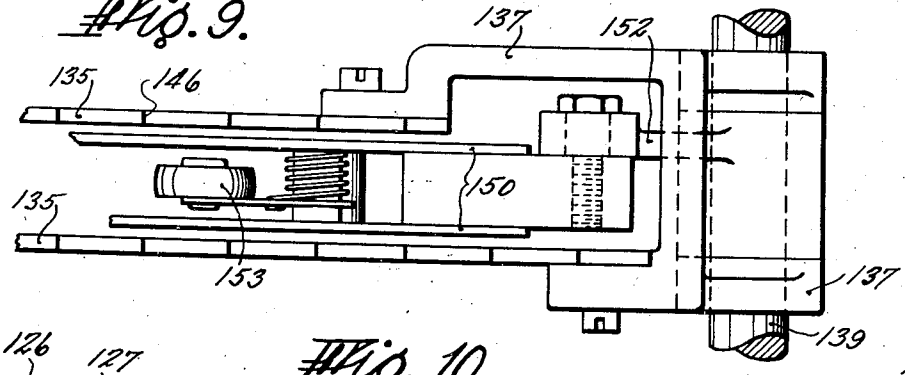
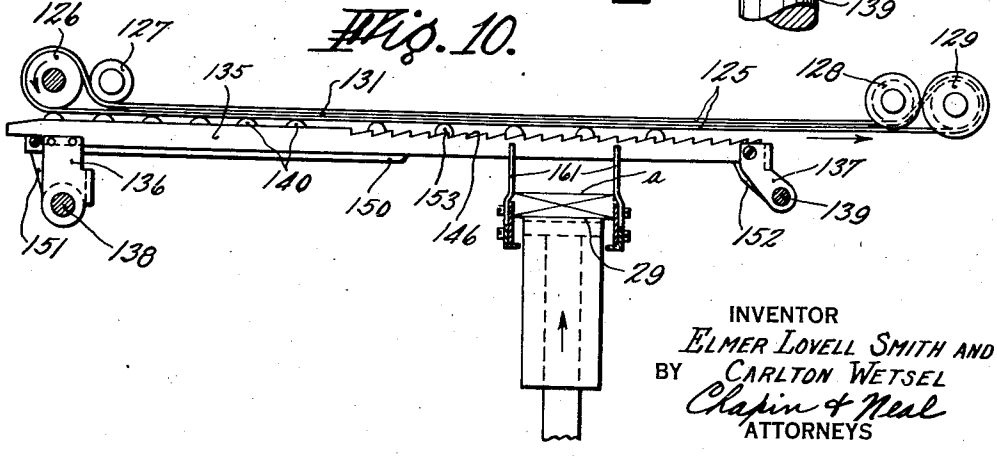


Fig. 10.



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Fig. 11.

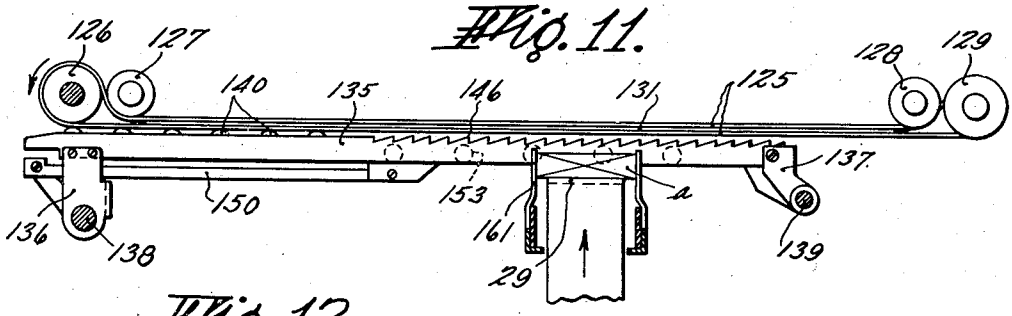


Fig. 12.

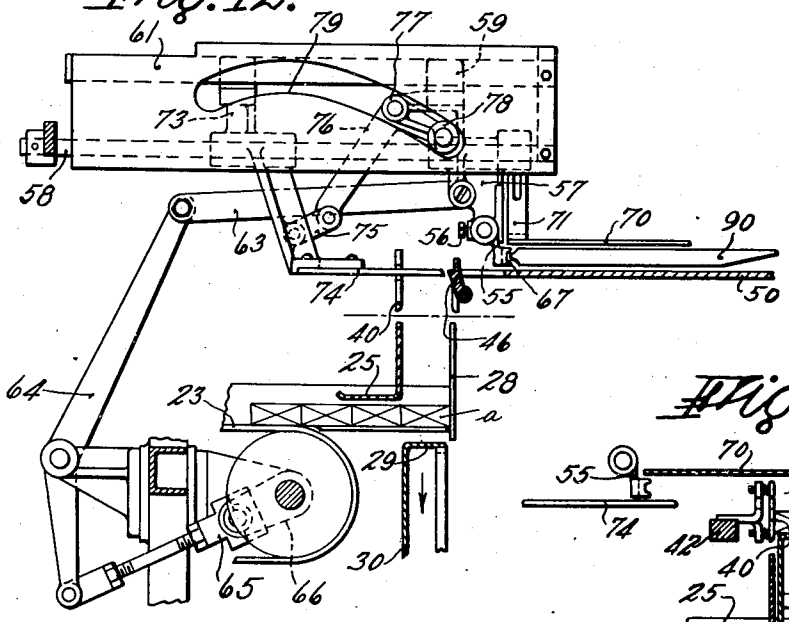


Fig. 13.

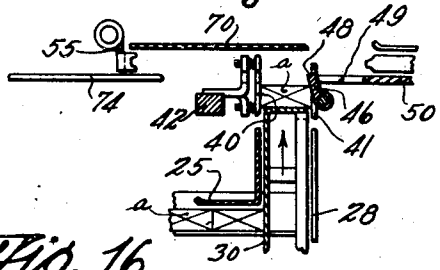


Fig. 14.

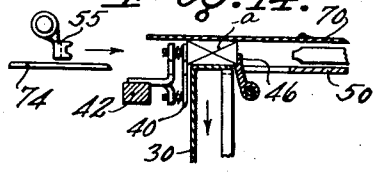


Fig. 15.

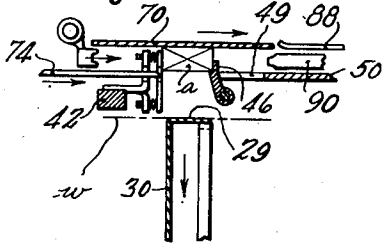
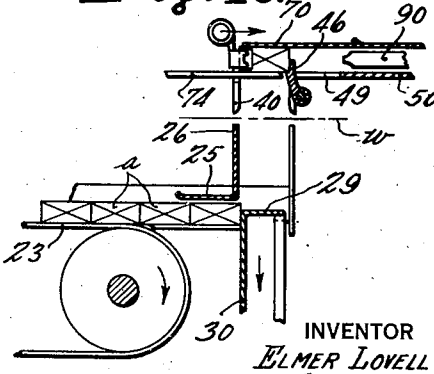


Fig. 16.



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Patented Oct. 5, 1937

2,095,104

UNITED STATES PATENT OFFICE

2,095,104

WRAPPING MACHINE

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Application October 1, 1935, Serial No. 43,088

11 Claims. (Cl. 93—2)

This invention relates to machines for wrapping articles of generally rectangular shape. One object is to improve prior wrapping machines, particularly those of the type adjustable from one size of article to another, in the matter of simplicity of construction and economy of operation. A further object is to improve the manner of holding the article in the folding box during the process of completing the circumferential wrapping and the initiation of the end folding. A further object is to improve the construction and operation of the rear bottom folding and rear tucking members. A further object is to improve the operation and the adjustability of the devices for applying a sealing liquid to the end flaps of the package. A further object is to improve the mechanism for feeding sheets of wrapping material into position to be engaged by the article and carried thereby into position in the folding box. Additional objects will appear from the following description and claims.

Referring to the drawings:

Fig. 1 is a side elevation of the machine embodying the invention, generally in median section;

Fig. 2 is a section through the machine showing the mechanism for feeding the wrapping material into position for engagement by the article;

Fig. 3 is a top plan detail of the mechanism for applying a sealing liquid to the end flaps of the partially wrapped package;

Fig. 4 is a detail of the adjustable cam mechanism for regulating the termination of the wrapper feeding operation;

Fig. 5 is a detail of the paper feed;

Fig. 6 is a detail of one of the paper supporting and feeding rolls;

Fig. 7 is a detail of the means for supporting the article within the folding box;

Fig. 8 is a detail in side elevation of the paper feeding roll shown in Fig. 6;

Fig. 9 is a detail showing the manner in which the movable paper feeding rolls are actuated;

Fig. 10 is a side elevation showing the parts of the paper feeding mechanism in the positions they occupy during the feeding of the paper;

Fig. 11 is a similar view showing the same parts in the positions they occupy after the termination of the wrapper feeding operation;

Fig. 12 is a detail of the rear bottom folder and the rear side tucker in a different position of operation than that shown in Fig. 1; and

Figs. 13, 14, 15 and 16 are diagrammatic views showing the progress of an article through the folding box.

Fig. 17 is a detail sectional view showing the wrapping material supply roll and a tensioning means therefor.

The machine is carried upon a base frame **20** which in this case is the main frame for the paper feeding mechanism. A subsidiary frame **21** is carried by this main frame for the purpose of supporting the wrapping mechanism proper, and bears at one end a plate **22** over which passes an article feeding belt **23**. This belt is driven at one end by a pulley **24** suitably driven, preferably continuously, and is suppported at its other end by an idler pulley which has been omitted from the drawings. Adjacent the pulley **24**, and vertically spaced above the belt, is a plate **25** adapted to ride on the tops of the articles being fed in, and having a vertical extension **26** serving as one side of an elevator well or article guiding chute. The plate **25** is preferably mounted on a member **27** laterally adjustable so as to change the position of the plate **25** and also of certain parts of the wrapper feed in order to accommodate different sizes of article. A second plate **28** is fixed on the frame to form the opposite side of the elevator well. Vertically movable in the elevator well is an elevator **29** having a depending skirt portion **30** acting when the elevator is up to prevent forward movement of the articles on the belt **23** in the well known manner. The elevator is carried on a bar **31** reciprocable in guides **32** and is operated by a link **33** pivoted to a bell crank lever **34** which derives its motion by means of a link **35** from a crank **36** on a constantly rotating shaft **37**. With the parts proportioned substantially as shown, the described linkage will give to the elevator a rapid up and down motion with a substantial dwell at its lower limit of motion.

As the article *a* is carried upwardly by the elevator it encounters the wrapper *w* (Figs. 13 to 16) and is then brought between a spring plate **40** and a fixed plate **41**. The spring plate **40**, which is carried by a laterally adjustable bar **42**, is formed with a wide bottom portion and with a generally T-shaped and relatively narrow upper portion as is best seen in Fig. 7. The lower wide portion is pressed towards the plate **41** by springs **43** and the bar of the T is similarly pressed by a spring **44**. The strengths of these springs are so adjusted that the pressure of each of the springs **43**, which are equal, is somewhat less than the pressure of the single top spring so that the pressure on the article will be roughly balanced. On the oppo-

site side of the elevator well from the T-shaped member 40 and situated in a slot of the fixed member 41 is a flapper 46 rotatably mounted against the force of a torsion spring 47 (Fig. 2). The flapper preferably has an article retaining notch 48 (Fig. 13) formed in its surface, and is adapted to be turned by the passage of the article out of the folding box so that it underlies the article in the manner usual for flappers of this general character. In this rotated position the flapper passes into a slot 49 in the floor 50 of the folding channel.

The operation of this portion of the mechanism will be most clearly understood from the diagrammatic views shown in Figs. 13 to 16. In Fig. 13 the article is shown as just engaging the flapper 46 after having picked up the wrapper. The article rests against the members 40 and 41 and the wrapper is tightly drawn around the top of the article and down upon its sides. The spring mounting of the member 40 is sufficiently flexible to accommodate slight changes in the widths of the articles, and also serves to store up enough energy due to the compression of the spring to cause a small lateral movement of the article at a later time as will be described below. In Fig. 14 the elevator has carried the article to the uppermost limit of its motion. In this position the lower right hand edge of the article (as viewed in that figure) has passed above the shoulder 48 in the flapper, so that the spring tension of the flapper can carry this shoulder into underlying relation to the article. The elevator is made narrower than the article so that this slight motion of the flapper is not interfered with. The article is now grasped between the top of the flapper and the T-shaped top of the member 40, with one edge supported underneath by the shoulder 48. Furthermore, the article will be shifted slightly by the recoil of spring 44 as soon as the article passes plate 41, so that its right hand edge as viewed in Fig. 14 will move a small amount onto the floor 50 of the delivery channel. The elevator can now recede without waiting for the support of the article to be taken over by the bottom folder as is customary in devices of this character. This simplifies the linkage necessary to produce the motion of the elevator, as no dwell at all is necessary at the upper limit of the motion.

The article is carried out of the folding box into the folding channel by a pusher 55 (Figs. 1 and 12) having a detachable connection 56 with a carrier 57. This carrier moves back and forth upon a rod 58 (Fig. 2) and has an upper guiding piece 59 which slides between guide bars 60, the slide rod and the guide bars being carried on a framework 61 supported from the main frame by a bracket 62. The carrier is periodically reciprocated by a link 63 pivoted to a bell crank lever 64 mounted for rocking movement on the frame and itself actuated by a link 65 coupled to a crank 66 on the shaft of the pulley 24. The carrier, the pusher carried by it, and other connected parts, receive one complete reciprocation for each cycle of the machine's operation. The rear tuckers 67 (Fig. 12) are preferably made integral with the pusher 55, the pusher being made detachable as described so that the tuckers may be replaced with others of the correct width and spacing if the size of the article is to be changed. A top hold-down plate 70 is carried by a bracket 71 secured by an adjustable screw and slot connection 72 (Fig. 1) from the carrier 57. This plate rests upon the article at all times while it is in the folding box, and moves with it while it is being carried by the pusher into the folding channel.

A second carrier 73 is slidable upon the same guide members as carrier 57 and bears a rear bottom folder 74. This second carrier is not directly operated by the link 63, but receives its motion from it in a modified form. For this purpose the carrier 73 is provided with a link 75 to which is pivoted one arm of a bell crank lever 76 itself pivoted at 77 to the carrier 57. The second arm of the bell crank carries a cam roll 78 running in a cam slot 79 formed in a plate which forms one side of the framework 61 supporting the guides on which the carriers slide. The two extreme positions of the carrier and the bottom folder carried by it are shown in Figs. 1 and 12. As the pusher carrier 57 advances, the bottom folder will at first move at a faster rate on account of the upward curvature of the cam slot, moving for a short time at the same rate as the pusher when the slot becomes horizontal, and finally slowing down with respect to the carrier. This construction permits the bottom folder to pass under the article rapidly, as will appear from comparison of Figs. 15 and 16, and then to dwell as shown by a comparison of Figs. 16 and 12 while the article is being pushed off onto the bottom plate 50 of the folding channel. The differential motion between the pusher and the bottom folder is accomplished by the use of a simple linkage, with only one rotating crank; and does not require that the bottom folder be spring mounted and stopped by contact with the opposing side wall of the elevator well as is the case with certain prior constructions. A very smooth and quiet operation results. The bottom folder is preferably made in two sections, one coming on each side of the neck of the T-shaped member 40 as is shown in Fig. 7.

Instead of providing for the manual adjustment of the spacing of the several members of the folding channel it is preferred to make the upper part of this channel readily removable so that the whole may be taken off the machine and replaced by one suited to the particular new article to be wrapped. This has proved in practice to be more satisfactory, particularly as it avoids danger of an unskilled operator making an incorrect adjustment of the parts. To permit the channel to be taken off, the bottom plate 50 previously referred to is provided at one end with lugs 85 (Fig. 1) adapted to interfit with pieces carried by a cross bar 86, and at the other end with dowel pins 87. The plate may be positively fastened down if desired, but in actual practice this has been found to be unnecessary. The other members of the removable chute are a top plate 88, held in position relative to the bottom plate by springs 89, and the usual plow folders 90, 91 and 92. The folder 91 is cut away at 93 to avoid contact with the glue applied as described below to the outside of the lower flap.

Glue or other sealing liquid is applied to the underside of the lower end flap of the package by a pair of spaced glue rolls 95 (Figs. 1 and 3) mounted to rotate in troughs 96 and driven continuously by a chain drive 97. The shaft of the glue rolls is suitably journaled in bearings on the troughs, both the rolls and the troughs being adjustable both laterally and longitudinally of the machine. The lateral adjustment, which is necessary in order to accommodate packages of differing lengths, is accomplished by securing each trough separately by a set screw 98 (Fig. 1) to a cross bar 99. The rolls can thus be set read-

ily to place a stripe of sealing liquid, which may be either glue or a solvent for one of the cellulose sheetings now commonly used as wrapping materials, at the desired point on the outside of the lower end flap of any package within the limits of adjustment of the machine. By applying this stripe to the lower flap which is always in line with the floor of the delivery channel, all necessity for vertical adjustment of the gluing mechanism is avoided. As stated above, the glue rolls also have an adjustment longitudinally of the folding channel, the purpose of which may be slightly more obscure since the rolls will apply a stripe of glue to the wrappers whatever their longitudinal position. In practice, however, it has been found that particularly when dealing with the cellulose sheeting type of wrapping material in which sealing of the flaps is accomplished by coating them with a solvent, it is deleterious to leave the flap too long in contact with the solvent applying device; and even when glue is being applied a better coating will result if the article and applying wheel are moving at the same rate during the entire application of the sealing liquid. Now it will be remembered that the articles are advanced into the folding channel from the folding box by the reciprocating plunger **55**. No additional mechanism is in the present case supplied for advancing the articles further along the folding channel, an article being carried along solely by the pressure of the articles behind it. Every article in the line therefore advances intermittently, and since the width of the articles is a constant quantity for any one size being wrapped each successive article will come to rest in the same place as its predecessor. In order to avoid the flaps remaining in contact with the glue rolls after the flap has been coated, these rolls are adjusted for any particular size of article so that they lie between the article flaps, as is clearly apparent in Fig. 3, when the line of articles has been brought to rest. For different articles the position of the gap between the flaps will of course be different, and hence it is necessary to provide a longitudinal adjustment for the applying rolls. For this purpose, as is best seen in Fig. 1, the bar **99** which carries both of the troughs, is borne on a bracket **100** slidable on the rails **21** forming the wrapping machine frame. A bolt **101**, provided with the usual tightening nut, also passes through one of a series of holes **103** in the rail. An adjustment of considerable magnitude is accomplished by moving the bracket and bolt along the rail to another of the holes **103**. An adjustment of small magnitude, used to give the final setting to the rolls, is accomplished by loosening the tightening nut on the bolt and sliding the bracket **100** along within the limits permitted by the slot **102**.

The mechanism for feeding the web of wrapping material and for severing wrappers of the proper length from it will next be considered. The wrapping material is initially supplied to the machine on a spool **105** (Figs. 2 and 17) from which it passes over a tension roll **106** provided with the usual equalizing rack and pinion connection **107** and drawn in a direction to take up the slack in the web by a spring **108**. The web next comes into engagement with alternating wires **109** and **110** which corrugate the material slightly in order to increase its rigidity when pushed through the cutting mechanism, these wires lying between cork rolls **111** geared to and resting on a steel roll **112** (Figs. 2 and 5). A change gear **113** connects a gear on the shaft of the roll **112** with a gear **114** on a shaft **115** conveniently driven as by a chain and sprocket connection from the shaft **37** previously referred to. The rolls **111** and **112** are preferably continuously driven and project the corrugated web across a support **116** and over a block **117** bearing a stationary knife blade **118**. Cooperating with this stationary knife is a rotatable knife **119** carried by a rotating shaft **120** driven from the gear **114** by a gear **121**. This shaft preferably carries disk like paper guiding fins **122** which serve to keep the leading end of the freshly severed web from following the rotating knife. This much of the web handling mechanism is largely conventional and need not be considered in more detail.

The mechanism for feeding the severed sheets forwardly into the wrapping means is in some respects similar to that shown in the Fischer and Fuller Patent 1,927,585, Sept. 19, 1933, but is simpler in construction and has certain operational advantages. Extending from the cutting rolls to and past the folding box are a pair of laterally spaced belts **125** adapted to contact with the upper side of the severed wrapper. Each of these belts passes around a set of pulleys **126**, **127**, **128** and **129**, one set being shown in Fig. 10. Although the pulleys themselves do not appear in Fig. 1, it will be apparent from the position of the belts **125** in that figure that one set of pulleys is associated with and mounted on the stationary cross bar **86** and the other set is associated with and mounted on the adjustable cross bar **42** which is held in adjusted position by a bolt and slot connection **130** with the frame. Each of these bars has a plate **131** which extends between the adjacent runs of the respective belt and both prevents friction and gives a support. The shaft of the pulleys **126** is driven by a gear **132** from the gear **121**, that pulley **126** located on the movable cross bar having a splined connection with the shaft so that it will be driven positively in any position of adjustment.

The belts travel continuously, and the paper feed is secured by pressing the leading end of the web or the severed sheet upwardly against the belt as in the Fischer and Fuller patent. The mechanism for accomplishing this is, however, radically different, and is divided into two parts, one being permanently engaged with the wrapping material and the other being vertically movable so that the feeding action can be terminated at the proper point. As in the Fischer and Fuller patent the linear speed of the belts is preferably greater than the speed with which the leading end of the web is being projected by the rolls **111**, **112**, and the belts slip over the projecting web end, giving a stroking action to it and keeping it taut during the cutting action. As soon as the sheet is severed from the web it partakes of the higher speed of the belts, running away from the leading end of the web from which it was cut and producing the desired spacing between successively delivered sheets.

The part of the wrapper engaging mechanism permanently in pressing engagement with the belts consists in a pair of separated roll bearing frames **135** (Fig. 10), supported at their ends on brackets **136** and **137** mounted on rods **138** and **139**. One of each similar pair of brackets is fixed in lateral position so as to remain in fixed relation to the cross bar **86**, while the other is adjustable on its supporting rod to permit it to be shifted for different widths of paper. As is best shown in Figs. 6 and 8 the rolls **140** are

separately mounted on arms 141 pivoted on pins 142 secured in the frame. Each arm has a projection 143 engaging a tie member 144 to limit the angular motion of the arm, and is pressed in a direction to carry the roll against the belt by a spring 145. As will be clear from Figs. 10 and 11, the rolls extend only part way along the frames, the remainder of the frames being formed with buttress-like teeth 146 which prevent smearing of the longitudinal stripe of glue when the paper is drawn into the folding box, and which by reason of their shape offer slight resistance to the forward motion of the sheet. The belts being on top only are not liable to contact with the glue.

The frames 150 which form the intermittent part of the wrapper engaging mechanism are mounted in the space within the spaced members of the frames 135 as is best shown in Fig. 9. These second frames are carried at one end by levers 151 (Fig. 10) rotatively fixed to the rods 138 and at the other end by levers 152 rotatively fixed to the rods 139. By rocking the rod 138 the frames 150 will be caused to move up and down with a parallel movement; the frames 135 which are rigid with their brackets 136 and 137, being unaffected by this motion since these brackets are free on their supporting rods. The frames 150 carry rollers 153 mounted similarly to the rolls 140 except that they are located further along the frames, coming adjacent that part of the frames 135 which is fitted with the teeth 146. To elevate and depress the frames 150 periodically the rod 138 is provided with an arm 155 (Fig. 4) attached at one end by a spring 156 to the frame and bearing at the other a cam roll 157. This cam roll bears against a cam 158 secured to the shaft 115 by an adjustable clamp 159. The cam and the shaft can be readily provided with a scale and a pointer respectively, so that the position of angular adjustment can easily be determined. Rotation of the cam relative to the shaft serves to vary the time at which the frame 150 is lowered and hence determines the time at which the feeding motion of the severed wrapper towards wrapping position is terminated. The time at which the frame is raised will, of course, also be varied by rotating the cam, but this is unimportant as the elevation of the frame occurs at a time when the sheet is still being advanced by the fixed rollers 140.

It may be advantageous to summarize briefly the operation of the wrapper feeding mechanism. As the leading end of the web is projected past the cutting mechanism by the pushing action of the rolls 111 and 112 it will enter between the belts 125 and the first of the series of fixed rolls 140. Since the belts are traveling faster than the rolls 111, 112, slippage will occur, drawing the web taut for the cutting operation. As soon as the cutters have acted, the severed sheet which now is well within the grasp of the belt and the fixed rolls, will start to advance at the speed with which the belt is moving. At somewhat the same period the vertically movable rolls rise, furnishing a continuous guide for pressing the wrapper against the belts throughout the lengths of the frames. Forward motion of the wrapper at the speed of the belts continues until the frame 150 is lowered by the action of cam 158. The wrapper descends with the rolls 153, which are driven only by contact with the belt, and rests upon these rolls and upon the teeth 146 of the frames 135. At the same time the forward end of the wrapper contacts with a paper stop 160 (Fig. 2) which is adjustably mounted so as to be adaptable for different lengths of wrapper. The wrapper rests in this position until it is contacted by the article *a* being raised by the elevator 29 through the well formed by the plates 26 and 28 and the end guides 161 (Fig. 10). Additional guides for the wrapper, similar to the toothed end of the frames 135, can be located on either side of the elevator well if desirable in order to maintain extra large wrappers in flat condition. If it is desired to provide the wrapper with a stripe of sealing liquid along a longitudinal margin during its passage into the machine, this can be done by a wheel 165 (Fig. 2) dipping into a trough 166 and laterally adjustable in a bar 167. The wheel is positively driven by a chain connection 168 from the shaft of gear 132.

What we claim is:

1. A wrapping machine comprising a folding box, an elevator for raising an article and a wrapper into the folding box, a plate on one side of the folding box, a spring pressed plate on the opposite side of the folding box having a vertical extension, a delivery channel adjacent the box, and a bottom folder constructed in sections to straddle the vertical extension of the spring pressed plate, the spring pressed plate being compressed by the article as the article enters the folding box and acting to force the article slightly onto the floor of the delivery channel when the article has come into complete alignment therewith, whereby the elevator may immediately return to its lowered position without the article dropping and without waiting for the bottom folder to assume the weight of the article.

2. A wrapping machine comprising a folding box, an elevator for raising an article and a wrapper into the folding box, a plate on one side of the folding box, a spring pressed plate on the opposite side of the folding box having a vertical extension, a shouldered spring pressed member rotatably mounted on the first side of the box, the shoulder on said member being adapted to underlie the article when the article is in position in the folding box, a delivery channel adjacent the box, and a bottom folder constructed in sections to straddle the vertical extension of the spring pressed plate, the spring pressed plate being compressed by the article as the article enters the folding box and acting to force the article slightly onto the floor of the delivery channel when the article has come into complete alignment therewith, whereby the elevator may immediately return to its lowered position without the article dropping and without waiting for the bottom folder to assume the weight of the article.

3. A wrapping machine comprising a folding channel having a floor, a removable structure including end flap folders, and sealing liquid applying devices mounted to engage the outside of the lower end flaps on a line with the floor, whereby different sizes of articles may be accommodated without the necessity of vertical adjustment of the sealing liquid applying device.

4. A wrapping machine comprising a folding channel having a floor, a removable structure including end flap folders detachably mounted above said floor, means for advancing partially wrapped articles intermittently along said channel, a pair of sealing liquid applying devices mounted to engage the outside of the lower end flaps on a line with the floor, whereby the removable structure may be replaced to accommo-

date different sizes of articles without the necessity of vertical adjustment of the sealing liquid applying devices, means for adjusting said devices towards and from each other to accommodate articles of differing lengths, and means for adjusting said devices longitudinally of the channel so that the articles will come to rest with the outstanding flaps of adjacent articles straddling the devices.

5. A wrapping machine comprising a folding box, means for introducing into the folding box an article with a wrapper partially folded around it, a pusher for ejecting the article from the folding box, a folder connected to the pusher for motion therewith, and means for imparting to the folder a motion initially faster than the pusher and subsequently decelerating with respect thereto.

6. A wrapping machine comprising a folding box, means for introducing into the folding box an article with a wrapper partially folded around it, a pusher for ejecting the article from the folding box, a folder, and a positive linkage connecting the pusher and the folder and operable to cause the folder to contact the wrapper before the pusher contacts the article, and subsequently to decelerate the folder with respect to the pusher to permit the pusher to clear the article from the folding box while the folder remains within the boundaries of the folding box.

7. A wrapping machine comprising a folding box, means for introducing into the folding box an article with a wrapper partially folded around it, a pusher for ejecting the article from the folding box, a folder, a positive linkage connecting the pusher and the folder and including a lever pivoted both to the pusher and to the folder, and a stationary cam engaging said lever to vary the position of the folder relative to the pusher as the pusher advances in its article ejecting motion.

8. A wrapping machine comprising a folding box, means for introducing into the folding box an article with a wrapper partially folded around it, a pusher for ejecting the article from the folding box, a slidable folder carriage, a lever pivoted to the pusher and to the folder carriage, a stationary cam plate engaging a roll on the lever, and a folder carried by the carriage.

9. A wrapping machine comprising a folding box, means for introducing into the folding box an article with a wrapper partially folded around it, a slidable pusher for ejecting the article from the folding box, a slidable folder carriage, a bell crank lever pivoted at its intermediate pivot to the pusher and at one end to the folder carriage, a stationary cam plate having a cam groove therein, a cam on the second end of the bell crank lever, and a folder on said folder carriage, the cam plate being so shaped as to permit the folder to contact the wrapper before the pusher contacts the article, and subsequently to decelerate the folder with respect to the pusher to permit the pusher to clear the article from the folding box while the folder remains within the boundaries of the folding box.

10. A wrapping machine comprising a folding box, an elevator for raising an article and a wrapper into the folding box, a spring-pressed plate on one side of the folding box, a shouldered spring-pressed member rotatably mounted on the opposite side of the box, the shoulder on said member being adapted to underlie the article when the article is in position in the folding box, and a delivery channel adjacent the box, the spring-pressed plate being compressed by the article as the article enters the folding box and acting to force the article slightly onto the floor of the delivery channel, against the action of the shouldered member when the article has come into complete alignment with the channel.

11. A wrapping machine comprising a folding channel, means for advancing partially wrapped articles intermittently along said channel, and a sealing liquid applying device positioned to engage and disengage an outstanding end flap of an article as the latter moves from one position of rest to the succeeding rest position, said flap being wholly out of contact with said device at the rest positions.

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