July 3, 1934. J. R. TINDAL ET AL 1,965,324

WRAPPING MACHINE FOR THIN ARTICLES

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Fig. 1.

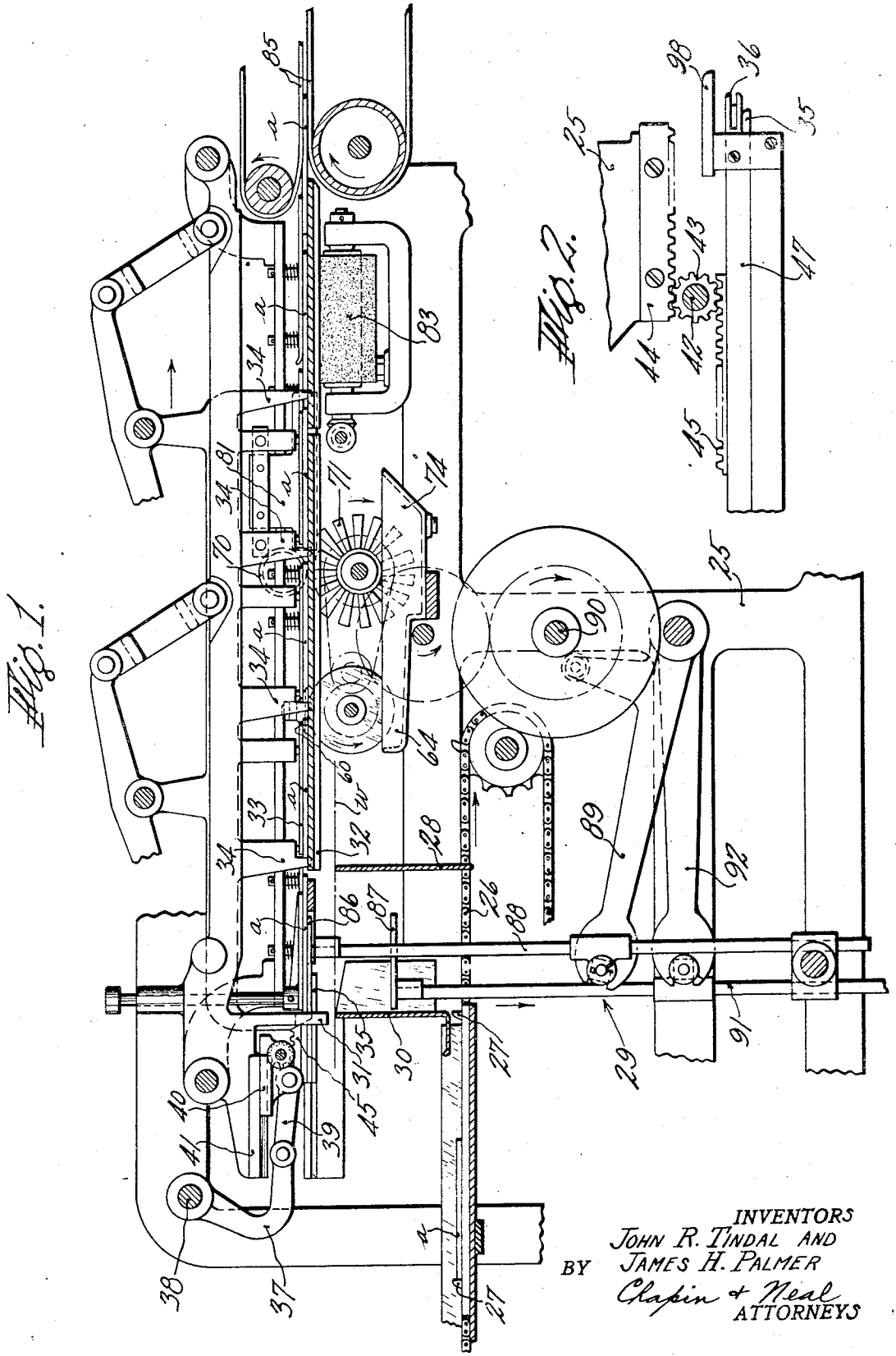


Fig. 2.

INVENTORS
JOHN R. TINDAL AND
JAMES H. PALMER
BY Clapin & Neal
ATTORNEYS

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Fig. 3.

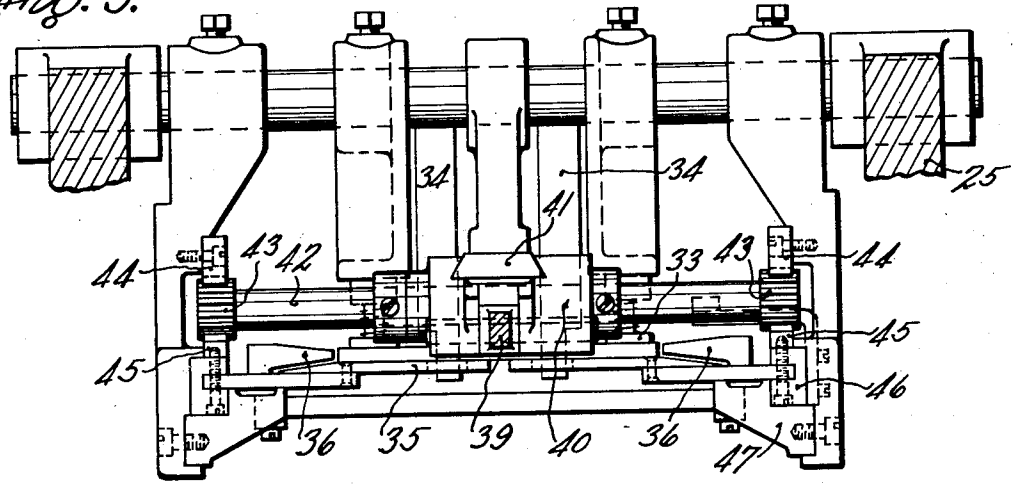


Fig. 4.

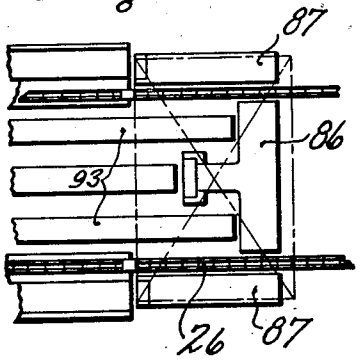


Fig. 5.

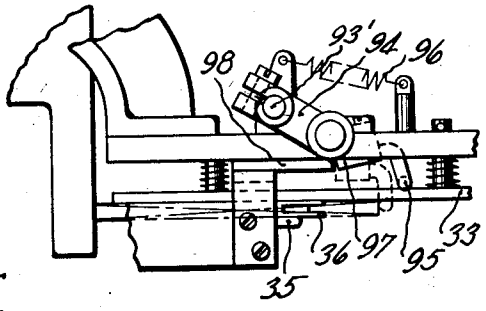


Fig. 6.

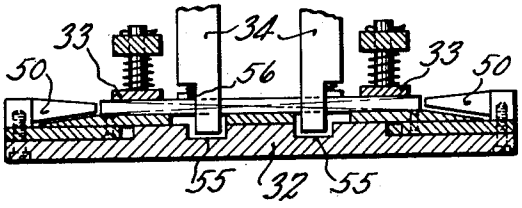


Fig. 7.

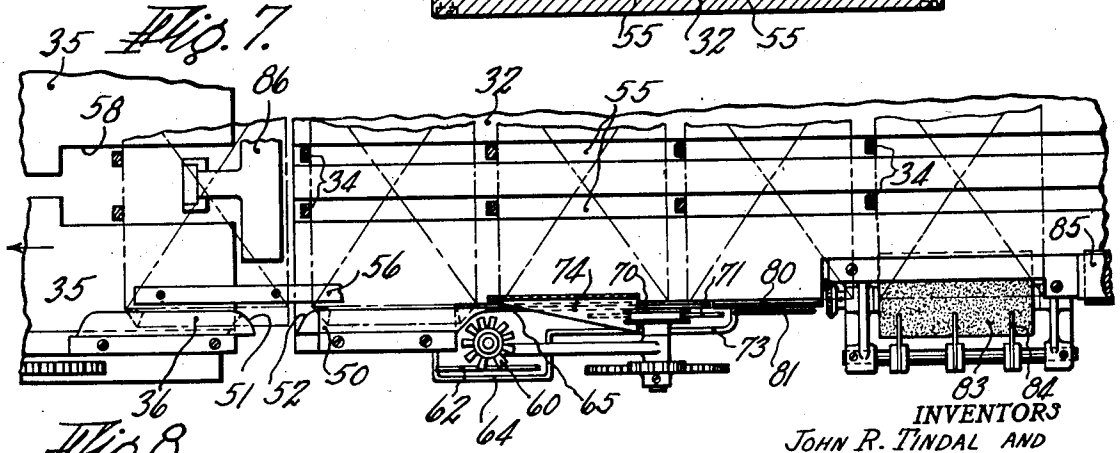
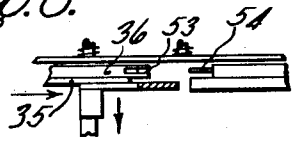


Fig. 8.



INVENTORS
JOHN R. TINDAL AND
JAMES H. PALMER
BY Chapin & Neal
ATTORNEYS

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Filed June 16, 1932 3 Sheets-Sheet 3

Fig. 9.

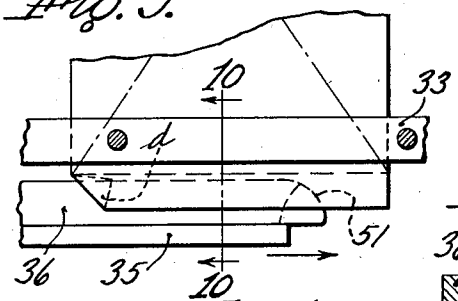


Fig. 11.

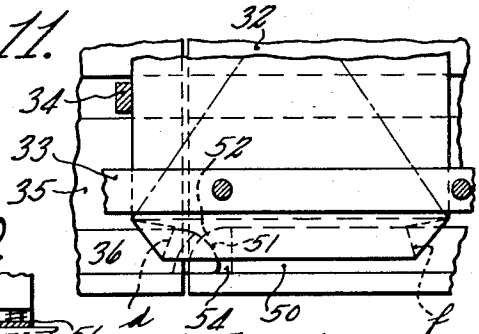


Fig. 10.

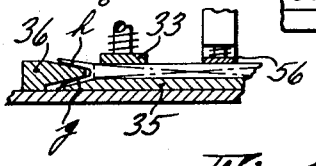


Fig. 12.

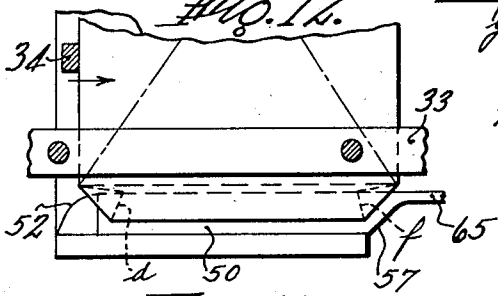


Fig. 14.

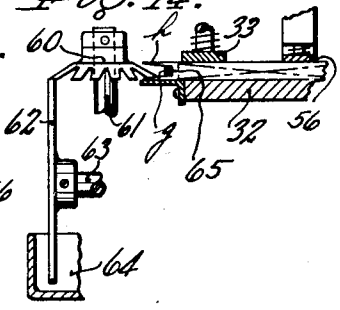


Fig. 16.

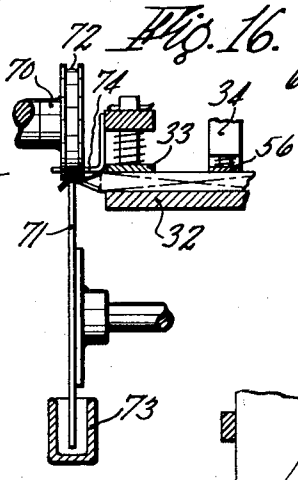


Fig. 13.

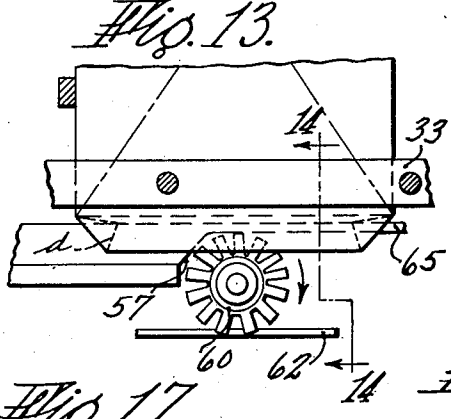


Fig. 15.

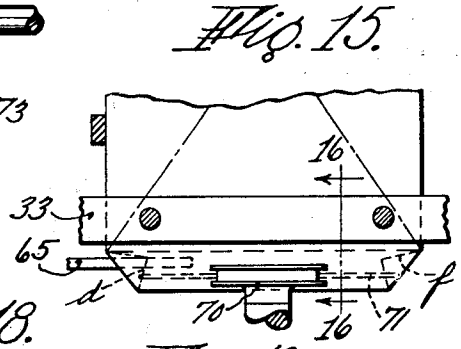


Fig. 17.

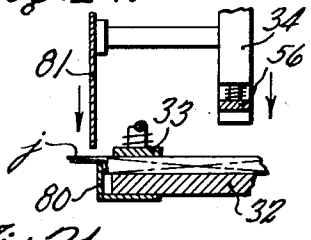


Fig. 18.

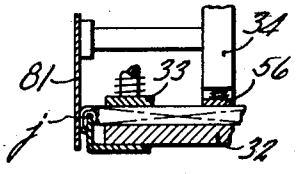


Fig. 19.

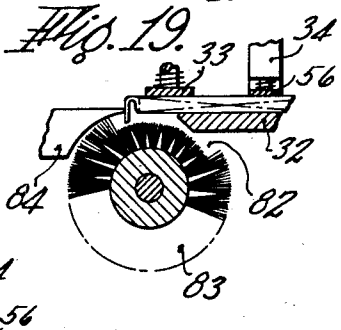


Fig. 21.

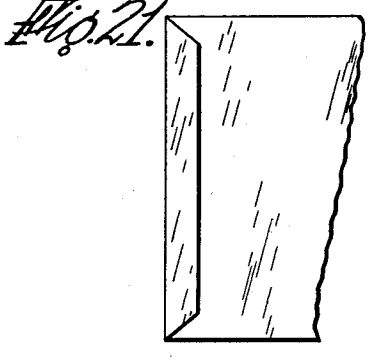
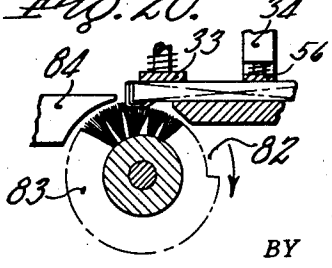


Fig. 20.



INVENTORS
JOHN R. TINDAL AND
JAMES H. PALMER
BY Clapin & Neal
ATTORNEYS

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UNITED STATES PATENT OFFICE

1,965,324

WRAPPING MACHINE FOR THIN ARTICLES

John R. Tindal, West Springfield, and James H. Palmer, Springfield, Mass., assignors to Package Machinery Company, Springfield, Mass., a corporation of Massachusetts

Application June 16, 1932, Serial No. 617,535

14 Claims. (Cl. 93—2)

This invention relates to machines for wrapping articles, having special reference to articles of little thickness. The formation of neat end folds on articles such as relatively thin pads of paper and the like has hitherto been attended by much difficulty. It is one object of this invention to provide a mechanism by which articles of this character may be wrapped neatly and rapidly; and at the same time may be tightly sealed. A further object is to improve the means of applying a sealing liquid, whether an adhesive or a solvent of a component of the wrapping material, to the flaps of the partially completed package. A further object is to improve the flap folding mechanism so that it may operate more or less independently of the thickness of the article. A further object is to improve the mechanism for introducing a thin flexible article into the wrapping machine. A further object is to improve the bottom flap and initial end tucking mechanism. A further object is to provide improved mechanism for holding an article during the formation of the initial folds. Additional objects will appear from the following description and claims.

Referring to the drawings,

Fig. 1 is a longitudinal section through a wrapping machine embodying the invention, showing only such parts of the machine as are material for an understanding of the mechanism forming the subject matter of the present invention;

Fig. 2 is an enlarged sectional elevation showing the rear bottom folder and the initial end tucker;

Fig. 3 is a detail end view of certain parts shown in Fig. 1;

Fig. 4 is a detail plan of the devices for introducing the article to be wrapped into the machine;

Fig. 5 is a detail side elevation of the mechanism for holding the article during the initial folding operation;

Fig. 6 is a detail section of the folding channel, looking from the rear of an article;

Fig. 7 is a detail plan showing one lateral half of the folding channel, the other half being similar;

Fig. 8 is a detail side elevation showing the conformation of the two end tuckers and their relationship to certain other machine parts;

Fig. 9 is a diagram showing the first end folding operation;

Fig. 10 is a section on line 10—10 of Fig. 9;

Fig. 11 is a diagram similar to Fig. 9 showing the formation of the second end folds;

Fig. 12 is a similar view showing the article in a subsequent position;

Fig. 13 is a similar view showing the application of sealing liquid to the lower end flap;

Fig. 14 is a section on line 14—14 of Fig. 13;

Fig. 15 is a view similar to Fig. 13 showing the creasing of the wrapper end extension and the application of sealing liquid to its lower surface;

Fig. 16 is a section on line 16—16 of Fig. 15;

Fig. 17 is a view similar to Fig. 16 showing the article in a subsequent position;

Fig. 18 is a similar view showing the initiation of the final end closing operation;

Figs. 19 and 20 are similar views showing successive stages in the final folding operation; and

Fig. 21 is a bottom view of the completed package.

The basic machine to which the invention has been shown as applied is that shown in the Smith and Fuller Patent 1,575,723, reissued as No. 18,341. Reference may be made to that patent for a complete description of the machine's general operation and of the appurtenant mechanism such as the paper feed. As far as it is necessary for a full description of the present invention to consider the basic machine, it may be described briefly as follows. Upon the frame 25 is mounted an intermittently operating infeeding chain conveyor 26 provided with lugs 27 by which the articles *a* to be wrapped are delivered into position adjacent an abutment 28. The specific mechanism for driving this conveyor may be of the type common in wrapping machines, and need not be described. An elevator, indicated generically at 29, carries the articles successively between the abutment 28 and a coacting guide 30 past a sheet of wrapping material *w* delivered by any suitable mechanism to an initial position shown in Fig. 1. The article and wrapper are carried together past a folder 31 and the end of a bed plate 32 into a position adjacent the opening of a horizontal wrapping channel formed by the bed plate 32 and overlying spring pressed plates 33 (Fig. 6). In the present case the channel is quite shallow as it is intended to handle thin articles. The articles are carried along the channel by a series of transporter fingers 34 preferably operated as described in Reissue 18,341. The manner in which the wrapping is accomplished will now be described.

By its passage between the folder 31 and the end of the bed plate 32 the wrapper is draped in inverted U form around the article. The rear

end of the depending wrapper—that at the left of the article as viewed in Fig. 1—is folded under the article by a horizontally reciprocating plate 35. At its sides this plate carries end tuckers 36 which are positioned ahead of the plate and operate in advance of it to turn in the rear end tucks *d*. The plate is cut down adjacent its end so that the slot formed between it and the tucker will be flaring. This order of folds is of assistance in making a neat fold on thin articles and the projection of the tucker assists in permitting it to interlock with the opposed side tucker as will appear later. The condensed character of the mechanism owing to the shallowness of the wrapping channel, coupled with the comparatively large distance from front to back of the article, make it difficult to reciprocate the folder 35 by the ordinary simple mechanism. In this case an arm 37, mounted upon a shaft 38, is oscillated periodically by mechanism which may conveniently be similar to that used for oscillating the arm 266 in Reissue 18,341. The free end of this arm is joined by a link 39 to a slide 40 reciprocable in ways 41 on the frame and corresponding generally to the slide 217 of the reissue. Instead of carrying the rear bottom folder directly, as was the case in the prior patent, the slide carries a shaft 42 having a pinion 43 at each end. These pinions mesh with stationary racks 44 carried by the frame, and also with racks 45 carried by slides 46 mounted in ways 47 and bearing the bottom folder 35 and the end tuckers 36. By this mechanism the folding plate and the tuckers are given a reciprocation twice as fast and twice as far as they would be were they directly connected to the arm 37.

After the rear bottom fold and the end tuck *d* have been started the article is pushed into the wrapping channel by the first of the transporter fingers. The second bottom flap is folded under the article by contact with the end of the bed plate, and the longitudinal seam of the wrapper is thereby sealed, the wrapper having been coated with a sealing liquid, underneath its right hand edge as viewed in Fig. 1, by any usual mechanism during its delivery to the machine. The second end tucks *f* are folded by stationary tuckers 50 mounted on the frame. The tuckers 50 and the tuckers 36 are shaped in a manner particularly adapted to the intended use of the machine on thin articles. Both pairs of tuckers are wedge-shaped in cross section, tapering towards the end of the article as shown in Figs. 3, 6 and 10. The leading ends of the tuckers of both sets are slanted or rounded when viewed in plan, as indicated at 51 and 52 respectively, so that the thicker portion of each tucker strikes the wrapper before the narrower portion to assist in forming a neat fold. The ends of the tuckers are preferably interlocked, a groove 53 in the tuckers 36 receiving a tongue 54 in the corresponding tuckers 50 as best shown in Figs. 8 and 11. In its reciprocation the bottom folder 35 comes quite close to the bed plate 32, bringing the tuckers 36 and 50 into interlocked relation. In order to hold the wrapper against coming undone when it is pushed along the bed plate the transporter fingers preferably extend into slots 55 in the bed plate as shown in Fig. 6. The bottom folder 35 is cut away as at 58 (Fig. 7) to clear the fingers. Spring pads 56 carried by the transporter also assist in keeping the package in firm contact with the bed plate as it is being moved along.

The trailing ends of the tuckers 50 are slanted off at 57 to present an acute angle adjacent the package (Fig. 13). In each space thus formed is located a mushroom shaped wheel 60, mounted on a constantly rotating shaft 61 (Fig. 14). The periphery of this wheel is preferably notched so that it acts as a series of fingers. The surface speed of the wheel along its area of contact with the wrapper preferably approximates the linear speed of the wrapper as the package is moved by the transporter, in order to produce a minimum amount of smearing. The lower surface of the roll 60 rides upon the periphery of a transfer disk 62 carried by a constantly rotating shaft 63 and dipping into a tank 64 containing sealing liquid. This liquid will by the mechanism described be spread over the upper surface of the lower flap *g*, as best shown in Fig. 14, the mushroom shape of the wheel serving to permit its ready entrance between the flaps and to keep the upper flap spaced from the lower one throughout the entire length of the package end. The tucks *d* and *f* are held by narrow extensions 65 of the tuckers 50 during this operation and its next subsequent advance.

After passing the wheels 60 the end extensions of the wrapper pass between rolls 70 and 71 which have a triple function. Each upper roll 70 has a peripheral groove 72 (Fig. 16) into which the lower roll 71 fits. The compression thus given to the wrapper extension creases the previously formed folds and partially bends the extension towards its final position. The compressive action also spreads out the sealing liquid between the lower flap *g* and the upper flap *h* and locks them together so that they will remain in adherence when they are finally turned under the package. In addition to these functions the roll 71 serves to apply a stripe of sealing liquid to the lower surface of the lower flap *g*, the roll dipping into a trough 73 for this purpose. So that the upper flap *h* will be certain to be presented properly to the rolls 70, 71 in spite of its initially flared position a deflector plate 74 is preferably positioned, as shown in Figs. 7 and 16, between the wheel 60 and the roll 70. The roll 71 is preferably notched in the same manner as roll 60.

During the subsequent forward movement of the article the wrapper end extensions pass over plates 80 by which they are turned upwardly towards the upper flaps as shown in Fig. 17. Upon the next descent of the transporter fingers folders 81, carried by one pair of the fingers, turn the end extensions bodily downwardly over the plates 80 (Fig. 18). In this condition the flattened flaps *j* are carried into gaps 82 formed in the bristles of generally cylindrical brushes 83 located at each end of the path of travel of the article and having their axes disposed longitudinally of the machine. The brushes are revolved so that their upper surfaces turn towards the article. Their drive may be either continuous or intermittent, the transfer of the articles into and out of the field of operation of the brushes occurring during the period of registry of the flaps *j* with the gaps 82. Fold retainers 84 serve to prevent misplacement of the flaps *j* prior to their engagement by the belt. The action of the brushes is shown in Fig. 20, the flaps being turned under the article and smoothed down in that position. From these brushes the articles are carried between discharge belts 85 of the usual form, serving to convey the articles from the machine and to hold the folds for a length of time sufficient to assure their permanent adherence. On account of the thinness of the articles, there is no sufficient extension of the upper flap to provide for sticking it to the bottom of the

package. It is therefore desirable to stick the two flaps together and then seal the lower one to the package bottom.

Going back now to the introduction of the article into the machine, the elevator 29, which was not described in detail, has features of novelty which require a more detailed discussion. The elevator is composed of two parts, a T-shaped plate 86 and a pair of marginal plates 87. Plate 86 is located between the parallel chains forming the conveyor 26 and plates 87 are outside them (Fig. 4). The body of plate 86 is in substantial alignment with the ends of plates 87 adjacent the bed plate 32, but its central shank projects only partway back between the marginal plates 87. The T-shaped plate 86 is carried upon a vertical slide 88 operated by a lever 89 oscillated from a cam on a constantly rotating cam shaft 90; while the marginal plates 87 are both carried by a second slide 91 reciprocated by an arm 92 also controlled by a cam on shaft 90.

By means of this construction of the elevator time is gained at both ends of the elevator stroke; and the article, in this case generally thin and flexible, is given support until the rear bottom folder 35 underlies it. The cams controlling the T-shaped plate and the marginal plates are so formed as to permit the latter to descend just prior to the advance of the folder 35 and to reach its lowermost position before the plate 86 has fully descended. Guide bars 93 between the chains of the conveyor 26 extend between the marginal plates 87 and preferably on either side of the shank of plate 86. It is thus possible for the conveyor to start the positioning of an article upon the plates 87 before the plate 86 has reached the bottom of its stroke; and the descent of plates 87 from their upper position before the descent of the plate 86 enables the rear folder 35 to slide underneath the article without interference and to assume the support of the article. The T-shaped form of the plate 86 assists in facilitating the reception of the article from the bars 93 when the elevator is lowered.

The articles being thin, they are comparatively light in proportion to their size. They would therefore tend to be displaced by the rear folder 35 and the end tuckers were some mechanism not provided for resisting this tendency. This device is preferably operated from the rear folder as is shown in Fig. 5. Upon a cross shaft 93' is mounted an arm 94 carrying a stop 95, conveniently in the form of a bail, the arm being normally held in the dotted line position of Fig. 5 by a tension spring 96. The arm 94 also has a projecting portion 97 which in the lowered position of the bail lies in the path of a cam plate 98 fixed to the rear bottom folder 35. During the initial part of the forward movement of the folder the stop 95 lies in front of the article to prevent its being moved forwardly. As soon as the plate 98 strikes the projection 97 the stop is raised, and as the folder remains in its advanced position until the article is carried away by the first transporter finger the stop is kept elevated and causes no further interference with the article.

The mechanism which has been described forms the best known manner of constructing the invention, and the description has therefore been given in some detail. It will be understood, however, that the invention is not limited to the precise forms shown. The scope of the invention will now be set forth in the following claims.

What we claim is:

1. In a wrapping machine having a horizontal article wrapping channel, an article feeding conveyor below the channel, and a reciprocable folder movable underneath the article at the entrance to the wrapping channel; a compound elevator movable between the conveyor and the wrapping channel comprising a central section and two marginal sections longer than the central section but substantially flush with it at their forward ends, and mechanism for moving the sections from the conveyor to the channel in unison and for moving the marginal sections back from the channel to the conveyor before the central section.

2. In a wrapping machine having a horizontal article wrapping channel, a pair of spaced endless carriers forming a horizontal article feeding conveyor below the channel, and a reciprocable folder movable underneath the article at the entrance to the wrapping channel; a compound elevator movable between the conveyor and the wrapping channel comprising a central section narrower than the space between the carriers and two marginal sections lying outside the two carriers and being longer than the central section but substantially flush with it at their forward ends, and mechanism for moving the sections from the conveyor to the channel in unison and for moving the marginal sections back from the channel to the conveyor before the central section.

3. In a wrapping machine having a horizontal article wrapping channel, a pair of spaced endless carriers forming a horizontal article feeding conveyor below the channel, and a reciprocable folder movable underneath the article at the entrance to the wrapping channel; a compound elevator movable between the conveyor and the wrapping channel comprising a T-shaped central section having its cross-piece on the end away from the folder and narrower than the space between the carriers and two marginal sections lying outside the two carriers and being longer than the central section but substantially flush with its cross-piece at their forward ends, mechanism for moving the sections from the conveyor to the channel in unison and for moving the marginal sections back from the channel to the conveyor before the central section, and guide bars extending between the carriers alongside the shank of the T-shaped section.

4. In a wrapping machine having a wrapping channel, means for moving an article along the channel, and means for moving an article and a wrapper substantially at right angles to the channel to position them adjacent its entrance; a reciprocable folder movable across the article, a guideway for the folder, a rack on the folder, a stationary rack, a pinion meshing with both racks, and means for reciprocating the pinion to cause corresponding reciprocation of the folder at a more rapid rate.

5. In a wrapping machine having a wrapping channel, means for moving an article along the channel, means for moving an article and a wrapper substantially at right angles to the channel to position them adjacent its entrance, and a reciprocable folder movable across the article while it is positioned at the entrance to the channel; a pivoted spring pressed stop normally blocking the entrance to the channel, and cooperating abutments on the folder and the stop acting to raise the stop out of channel-blocking position during the advance of the folder.

6. In a wrapping machine having a wrapping channel and mechanism for carrying a partially

wrapped article along it, a pair of stationary tuckers of prismatic form positioned on opposite sides of the channel, the tuckers being of wedge-shaped cross-section tapering towards the article and being rounded on their ends first to contact with the wrapper, the channel being beveled adjacent the tuckers so as to form slots slanting away from the plane of the channel bottom, and a pair of movable tuckers reciprocable in line with the stationary tuckers and having a form similar to that specified for the stationary tuckers.

7. In a wrapping machine having a wrapping channel and mechanism for carrying a partially wrapped article along it, a pair of stationary tuckers of prismatic form positioned on opposite sides of the channel, the tuckers being of wedge-shaped cross-section tapering towards the article and being rounded on their ends first to contact with the wrapper, the channel being beveled adjacent the tuckers so as to form slots slanting away from the plane of the channel bottom, and a pair of movable tuckers reciprocable in line with and mating with the stationary tuckers and having a form similar to that specified for the stationary tuckers, the reversely rounded ends of each mating pair of stationary and movable tuckers being one slotted and the other tongued so as to interfit.

8. A wrapping machine having means for forwarding a partially wrapped article having spaced outstanding end flaps, a support for one of the flaps, a mushroom shaped wheel having its axis perpendicular to the plane of the outstanding flaps and positioned to pass into the space between the flaps with its flat surface in contact with the inner surface of the supported flap, and means to supply a sealing liquid to the flat surface of the wheel.

9. A wrapping machine having means for forwarding a partially wrapped article having spaced outstanding end flaps, a support for one of the flaps, a mushroom shaped wheel having its axis perpendicular to the plane of the outstanding flaps and positioned to be straddled by the advancing spaced flaps with its flat surface in contact with the inner surface of the supported flap, the wheel being notched so that its periphery is divided into a plurality of finger-like portions, and means to supply a sealing liquid to the flat surface of the wheel.

10. A wrapping machine comprising means for supporting a partially wrapped article having opposed spaced end flaps, means for applying a sealing liquid to the inner surface of one of the flaps, means for compressing the flaps together to cause their adherence, means for applying a sealing liquid to one outer surface of the composite flap so formed, and means for turning over the composite flap upon the side of the wrapped article with its coated side in contact therewith.

11. A wrapping machine comprising means for supporting a partially wrapped article having opposed spaced end flaps, means for applying a sealing liquid to the inner surface of one of the flaps, a grooved roller and a disk roller coacting with the groove to crease the composite end flap and press the coated surface of one of the component flaps against the other, means for applying a sealing liquid to one of the rollers thereby coating the outer surface of the composite flap, and means for turning over the composite flap with its coated side against the wrapped article.

12. A wrapping machine comprising a folding channel, means for moving an article and a wrapper in a direction at right angles to the channel so that they are positioned in alignment therewith with the wrapper draped in U form about the article, means for advancing the partially wrapped article along the channel, a folder movable in the direction of the channel to lay down one extending side of the U, and a tucker similarly movable to lay an end tuck against the end of the article, the tucker being positioned in advance of the folder to turn in the end tuck prior to the folding of the adjacent extending part of the U-shaped wrapper against the article.

13. A wrapping machine comprising a folding channel, a parallel motion transporter movable to carry the article along the channel, means for folding the wrapper about the article with a single extension of the wrapper at the end of the article, a stationary folding plate at the side of the channel, a plate carried by the transporter positioned to fold the wrapper end extension over the stationary plate and to move with the article to maintain the extension in folded condition, a cylindrical brush rotatable on an axis parallel to the path of motion of the article along the channel and having a longitudinally extending gap in its bristles, the rotation of the brush and the motion of the transporter being so coordinated that the folded end extension of the wrapper is carried by the transporter plate into the gap in the bristles and is released by the plate before the bristles contact with the flap, whereby the brush will wipe the folded end extension against the face of the article.

14. A wrapping machine comprising means for folding a wrapper partially about an article so that it lies against two adjacent sides of the article with marginal portions projecting beyond the article end, a tucker operable to press against the end of the article the marginal portion of the wrapper adjacent one of said sides, a folder operable to fold a further portion of the wrapper against the side of the article opposite the other of the first mentioned sides, and means to cause relative movement between the article, the tucker and the folder so that the tucker operates upon said marginal portion of the wrapper before the folder contacts with the wrapper.

JOHN R. TINDAL.
JAMES H. PALMER.