July 6, 1965 T. L. HARRISON ETAL 3,192,685

VARIABLE PACKAGING MACHINE

Filed March 28, 1962 6 Sheets-Sheet 1

Fig. 1.

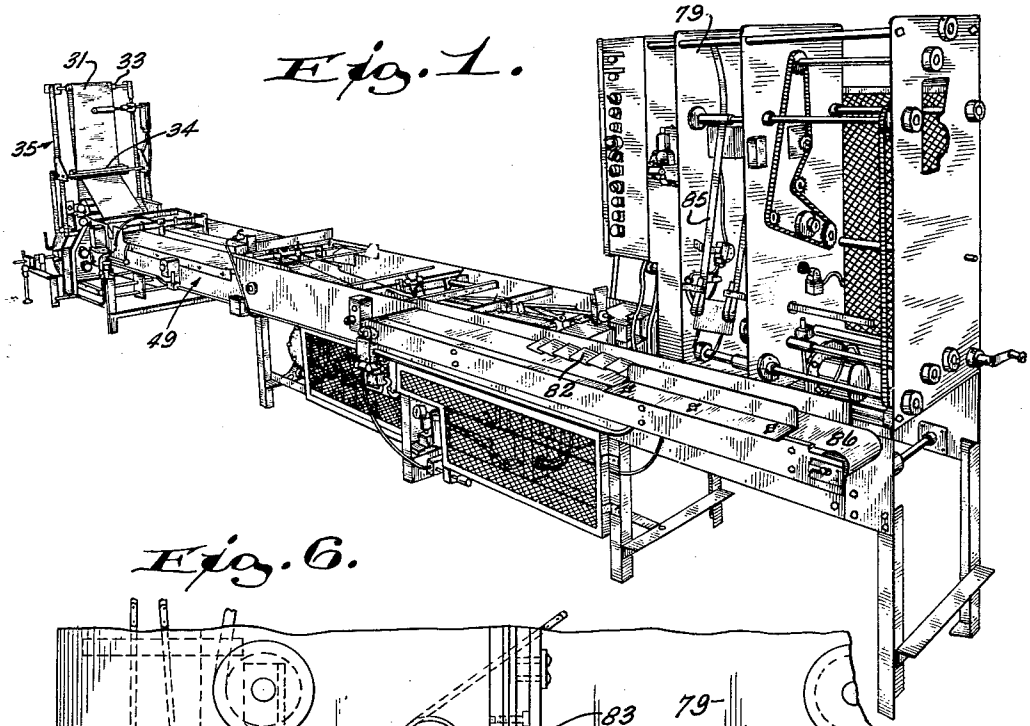
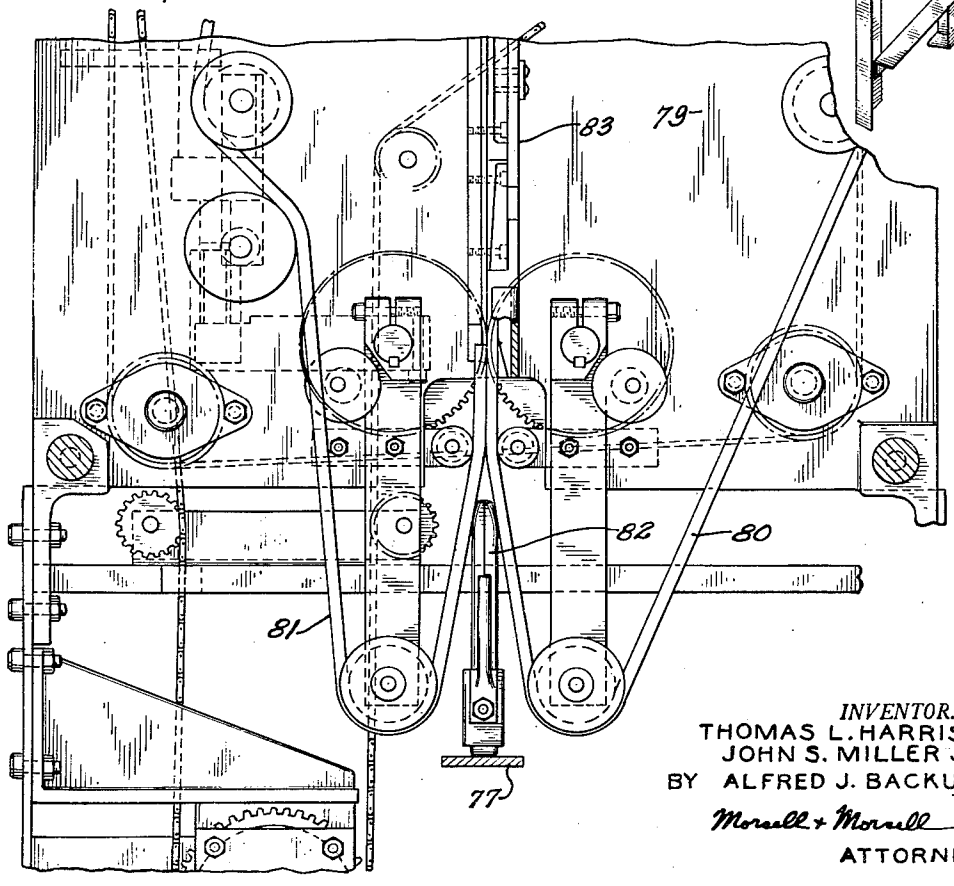


Fig. 6.



INVENTOR.
THOMAS L. HARRISON
JOHN S. MILLER JR.
BY ALFRED J. BACKUS
Morsell & Morsell
ATTORNEYS.

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VARIABLE PACKAGING MACHINE

Filed March 28, 1962 6 Sheets-Sheet 2

Fig. 1.

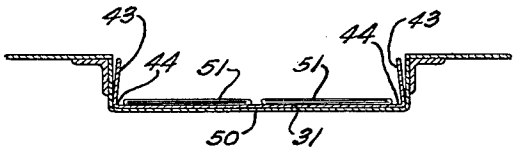


Fig. 2.

INVENTOR.
THOMAS L. HARRISON
JOHN S. MILLER JR.
BY ALFRED J. BACKUS

Morsell & Morsell
ATTORNEYS.

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VARIABLE PACKAGING MACHINE

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Fig. 9.

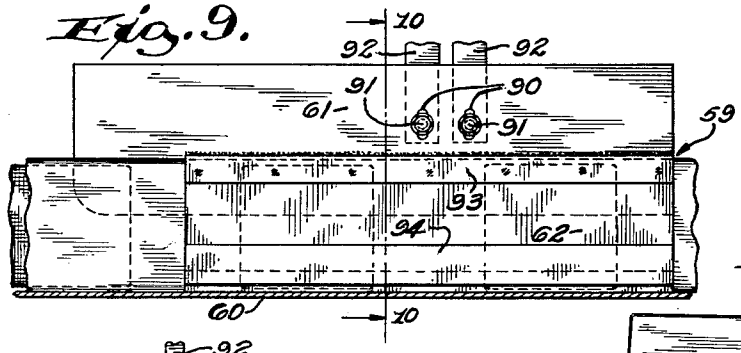


Fig. 10.

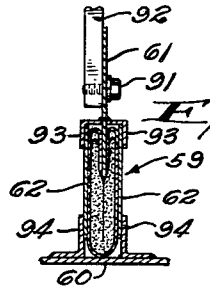


Fig. 8.

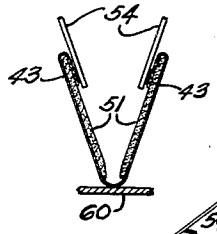


Fig. 3.

INVENTOR.
THOMAS L. HARRISON
JOHN S. MILLER JR.
BY ALFRED J. BACKUS
Morsell & Morsell
ATTORNEYS.

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VARIABLE PACKAGING MACHINE

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Fig. 4.

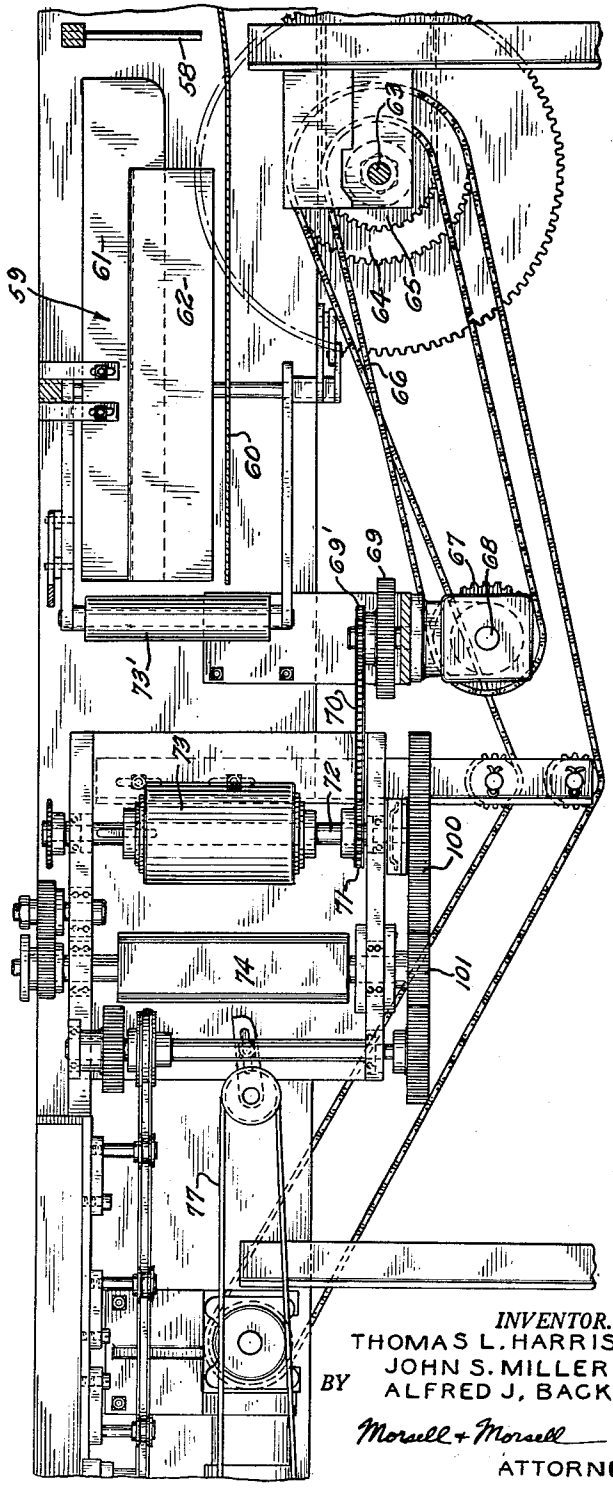


Fig. 12.

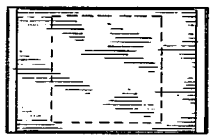
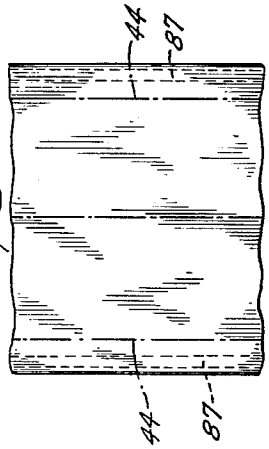


Fig. 11.



INVENTOR.
THOMAS L. HARRISON
JOHN S. MILLER JR.
ALFRED J. BACKUS
BY Morsell + Morsell
ATTORNEYS.

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VARIABLE PACKAGING MACHINE

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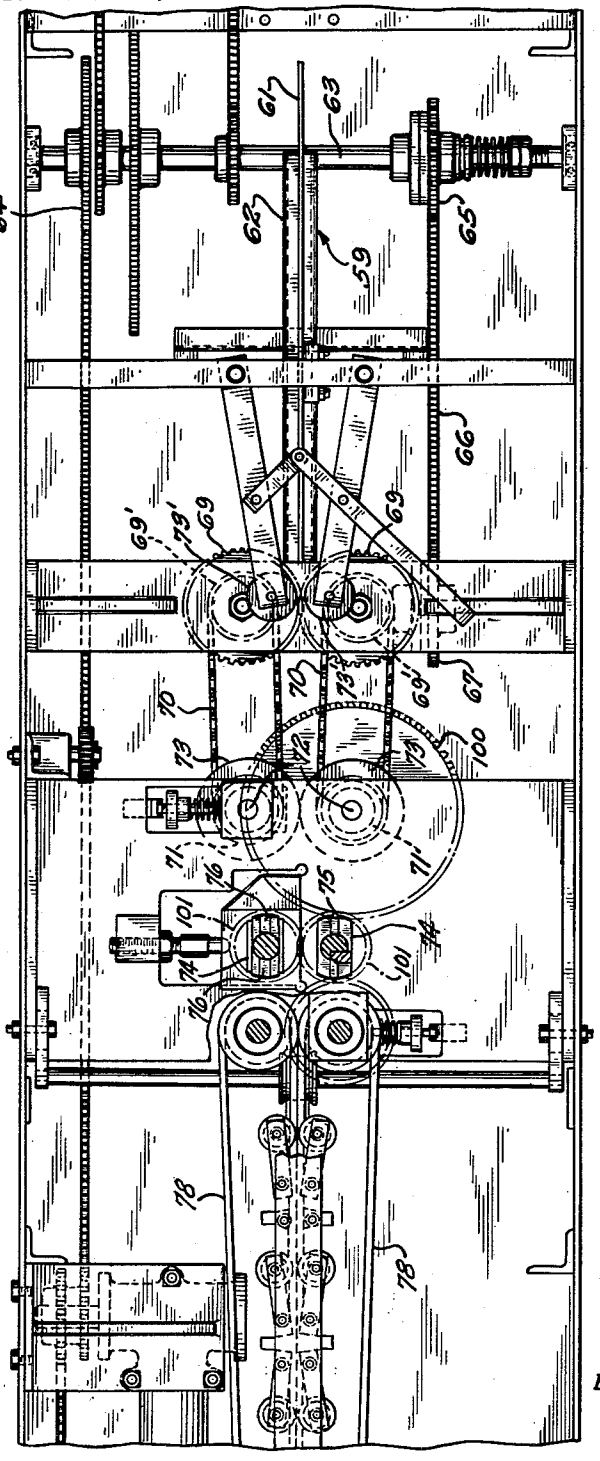


Fig. 5.

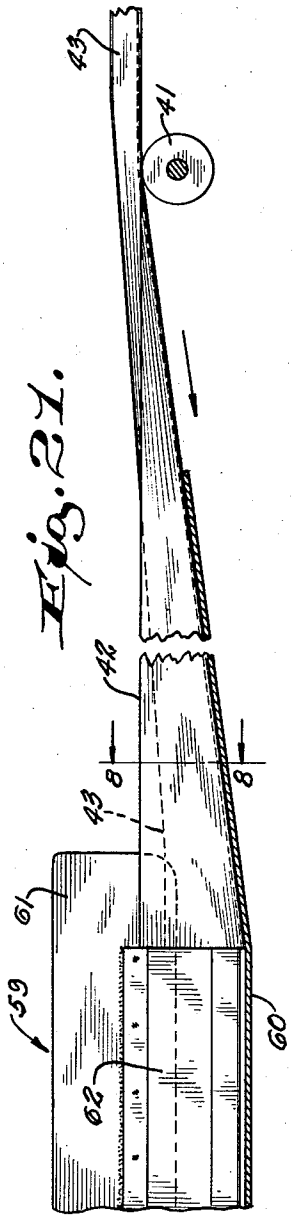


Fig. 21.

INVENTOR.
THOMAS L. HARRISON
JOHN S. MILLER JR.
ALFRED J. BACKUS

BY Morsell & Morsell

ATTORNEYS.

July 6, 1965 T. L. HARRISON ETAL 3,192,685

VARIABLE PACKAGING MACHINE

Filed March 28, 1962 6 Sheets-Sheet 6

Fig. 13.

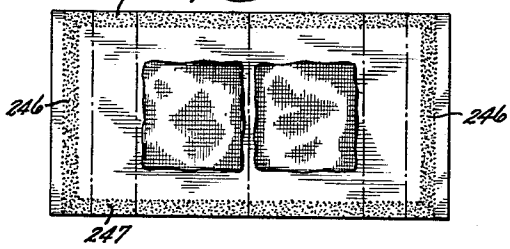


Fig. 16.

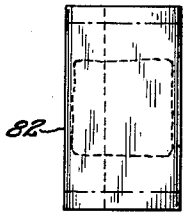


Fig. 14.

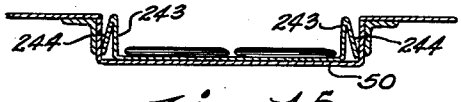


Fig. 17.



Fig. 15.

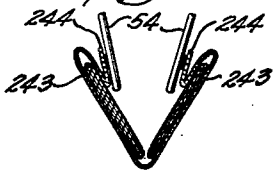


Fig. 18.

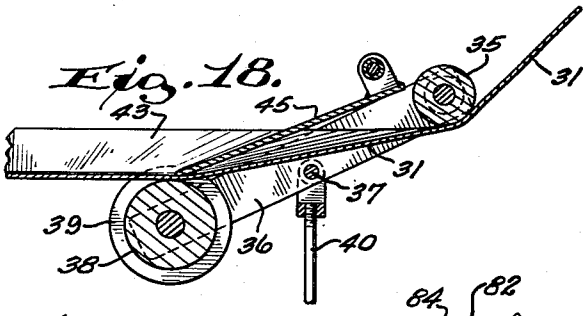


Fig. 19.

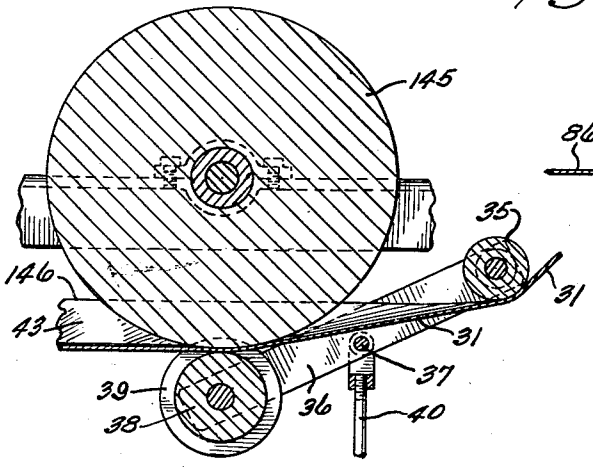
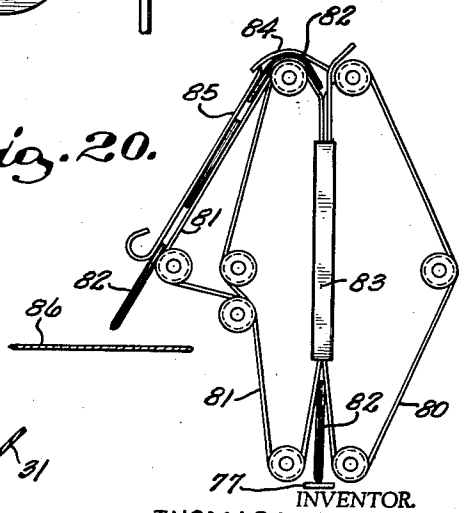


Fig. 20.



INVENTOR.
THOMAS L. HARRISON
JOHN S. MILLER JR.
BY ALFRED J. BACKUS
Morsell & Morsell
ATTORNEYS.

United States Patent Office 3,192,685 Patented July 6, 1965

3,192,685

VARIABLE PACKAGING MACHINE

Thomas L. Harrison, Menomonee Falls, John S. Miller, Jr., Milwaukee, and Alfred J. Backus, West Bend, Wis., assignors to Pratt Manufacturing Corp., Milwaukee, Wis., a corporation of Wisconsin

Filed Mar. 28, 1962, Ser. No. 183,308
9 Claims. (Cl. 53—180)

This invention relates to improvements in continuous packaging machines.

The present invention is particularly useful in the continuous packaging of relatively flat items, such as surgical pads or the like, and is particularly suited to the packing of either two superimposed pads in a single wrapper or a single, double-length pad where two halves are superimposed.

Briefly the invention involves the continuous feeding of a flat web of paper, the forming of said web into a channel-shaped cross-section with side flanges between which the items to be packaged are deposited, the gradual infolding of the web on a longitudinal center line in such a manner as to prevent jamming and to provide for accuracy in the positioning and folding, the infolding of said flanges into superimposition with the sides from which they are bent and over edge portions of the items, the forming of the package into its final, relatively flat shape, the severing of the web transversely between the items to form individual packages, and the closing of the ends.

It is a general object of the present invention to provide mechanism for expeditiously carrying out the above steps.

A further object of the invention is to provide apparatus which is capable of performing the various operations without pulling or tearing the paper, without causing jamming of the products, and with accuracy in the final article so as to insure the continuous production of neat, well squared packages.

With the above and other objects in view, the invention consists of the improved continuous packaging machine, and all of its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating preferred embodiments of the apparatus for carrying out the invention, in which the same reference numerals designate the same parts in all of the views:

FIG. 1 is a perspective view, principally in side elevation, showing one form of the improved apparatus;

FIG. 2 is a fragmentary perspective view showing the web-feeding and initial forming end of the apparatus;

FIG. 3 is a perspective view looking generally in a longitudinal direction toward the discharge end of the apparatus;

FIG. 4 is a fragmentary vertical, longitudinal sectional view showing the final package forming and cut-off mechanism;

FIG. 5 is a top plan view of the portion of the mechanism shown in FIG. 4;

FIG. 6 is a view, generally in elevation, showing one form of mechanism for closing the ends of the packages;

FIG. 7 is a fragmentary transverse sectional view, taken approximately on the line 7—7 of FIG. 2, showing the first step in the forming of the web and showing items in position thereon;

FIG. 8 is a view, taken approximately on the line 8—8 of FIG. 21, showing the web after it has been partially folded into V-form and after the flanges have been urged into superimposed position on the inner portions of their respective sides;

FIG. 9 is a fragmentary side elevational view showing the package forming portion of the device;

FIG. 10 is a sectional view, taken on the line 10—10 of FIG. 9;

FIG. 11 is a plan view of a portion of the flat web before folding showing the adhesive areas;

FIG. 12 is a plan view of one of the completed packages of the type made from the web of FIG. 11;

FIG. 13 is a view of a fragment of web in flat form showing the adhesive strips for forming an alternate type of package;

FIG. 14 is a transverse sectional view, similar to FIG. 7, showing the modified package of FIG. 13 in a first folded stage;

FIG. 15 is a view similar to FIG. 8 showing the modified package of FIGS. 13 and 14 in the partially folded condition corresponding to FIG. 8;

FIG. 16 is a plan view of one of the completed packages formed as in FIGS. 13, 14, and 15;

FIG. 17 is a view like FIG. 8 showing a single, double-length surgical sponge in position being packaged, rather than two separate sponges;

FIG. 18 is a fragmentary vertical, longitudinal sectional view through the forming plate and web-supporting rollers of FIG. 2 to show how the web is changed from flat condition to the U-shaped condition of FIG. 7;

FIG. 19 is a view, similar to FIG. 18, showing a modification where a forming wheel is used in place of the forming plate of FIG. 18;

FIG. 20 is an elevational view in diagrammatic form showing the complete end folding and discharge conveyors of FIG. 6; and

FIG. 21 is a fragmentary vertical sectional view showing the change in fold as the web progresses from the form of FIG. 7 to the form of FIG. 10.

Referring more particularly to the drawings, first to FIG. 2, the numeral 30 designates a supply roll from which a web of paper 31 is withdrawn, the web being guided upwardly past a roller 32 between top rollers 33, and then down beneath a roller 34. The last-mentioned rollers are all supported on upright standards 35 whereby the paper may be guided to such an elevation that it can be withdrawn in a downward direction. The arrangement is such that the portion of the web which travels between the roller 34 and another roller 35 will be moving at an angle of approximately 45°.

The roller 35 is suitably supported for rotation between the ends of arms 36 (see also FIGS. 18 and modification FIG. 19). The arms 36 are supported for swinging movement around an intermediate rod 37 which is suitably supported in the frame. The lower ends of the arms 36 on the other side of the pivot rod 37 rotatably support a forming roller 38 having spaced forming collars 39 thereon. Any suitable means may be provided for adjustably maintaining the arms 36 at a predetermined angle so as to cause the web to travel from beneath the roller 35 to the roller 38 at a selected angle. As shown in FIG. 18, a vertically adjustable rod 40 may be moved up and down to vary the elevation of the rod 37 and, hence, the angle at which the web is fed downwardly from the roller 35, may be varied to suit requirements. It is, however, important that this portion of the web be fed downwardly at an angle.

As the flat web 31 leaves the underside of the roller 35 it is acted on by a suitable forming member to cause bending up of the edges of the web so as to provide upturned flanges 43 folded on lines 44. One way of accomplishing this purpose is to use a forming plate 45 which is supported at an angle as shown in FIGS. 2 and 18. The width of the plate is equal to the distance desired between the two fold lines 44. The width of the forming plate is also such with respect to the spacing between the two collars 39 on the roller 38 that the forward edge of

the plate coacts with the collars to produce the upwardly-flanged operation on the web shown in FIG. 7. Other equivalent means may be employed in lieu of the forming plate, such as a forming wheel 145 as shown in FIG. 19, which wheel has the width of the plate 45 to to also coact with the collars 39 in causing the web to flange upwardly as at 43 in FIGS. 18 and 19. For proper results the lower periphery of the roller 35 should be at such an elevation with respect to the elevation of the roller 38 that said lower periphery is approximately in the same horizontal plane as the uppermost edges 46 (or 146 of FIG. 19) of the flanges 43. With this arrangement the flanges are formed gradually without damaging the web and without producing wrinkles or other imperfections.

If desired, the web may have longitudinally-spaced marks 47 thereon (FIG. 2) which interrupt the beam of electric eye mechanism 48 at periodic intervals for a purpose to be hereinafter described.

Forwardly of the forming portion there is a horizontal frame section designated generally by the numeral 49 and which supports a metal channel 50, as shown in FIG. 7. The channel is of slightly greater width than the width of the flanged paper stock to support and guide the same, as shown in FIG. 7. The channel preferably has a downward incline of about 1" per foot to relieve tension on the web. Thereafter, the surgical pads 51 which are to be packaged are deposited on the moving web in longitudinally-spaced relationship while the web is in the condition of FIG. 7. In most instances the surgical pads are deposited in transversely aligned pairs, as shown in FIGS. 2 and 7, one on each side of the longitudinal center line of the web. The machine is, however, adapted to also package a single double-length pad which will extend all the way across the web, one of such double-length pads 251 being shown in a later stage in FIG. 17, being folded around a rod 252.

Referring now to FIGS. 1, 3, and 21, it will be seen that the frame portion extends for a substantial distance before final closing of the package sides around the products. This substantial length of travel is important to provide for gradual shaping of the package to final form. By doing this operation gradually and in the novel way hereinafter described, the folding is done with accuracy and jamming of the product is eliminated. Furthermore, the resulting package is more square and accurate.

Referring now to FIGS. 3 and 21 (the latter figure being in a reverse direction from FIG. 3), the channel-shaped support 50 has terminated at roller 41 of FIG. 21 and the moving web is gradually urged into the V-shape shown at the lower end of FIG. 3. As the V-shape is first being formed, the package flanges 43 at first project inwardly toward one another, as shown at the lower end of Fig. 3, over the upper ends of the surgical pads 51. It will be noted that the lower end of each pad is at the apex of the fold. Thereafter the flanges 43 are acted upon by fingers 52, then by fingers 53, and then by fingers 54. These fingers are suitably supported from transverse members 55, 56, and 57 which are above the web. The action of the fingers is to cause gradual bending of the flanges 43 down into super-imposed position over the upper portions of the surgical pads 51, as shown in FIG. 8. As the web continues its travel, it passes between spaced vertical fingers 58 and into a final former which is designated generally by the numeral 59 in FIGS. 9, 10 and 21. It is preferred to have the portion of the apparatus just described so supported at downward incline, as shown in FIG. 21, on the supporting strip 60 as to cause the web, as it changes from the open condition at the left in FIG. 21 and in FIG. 10, to compensate for the change in form without causing strains on the web. This downward incline is such that the upper periphery of the roller 41 of FIG. 21 is in the same horizontal plane as the upper portion 42 of the partially formed package as shown in FIG. 21.

As the web enters the vertical former 59 it is supported on a longitudinally-extending metal strip 60 (see FIG. 10). The former includes a central separator plate 61 which is supported to project downwardly between the paper flanges 43. The plate 61 has vertical slots 90 through which adjustment bolts 91 extend, the bolts being carried by vertical supports 92 which are suitably supported from above. Projecting from opposite sides of the plate 61 are half channels 93, and connected at their upper ends to the sides of the half channels 93 are the upper edges of side members 62, the lowers ends of the latter being slidable with respect to base angles 94. As a result of this arrangement, by raising and lowering the plate 61 the half channels 93 are raised or lowered and the effective height of the former is varied to suit the particular package. In use, the now vertical sides of the package are guided between the sides 62 of the former 59, thus the package is in nearly its final form in FIG. 10.

Referring now to FIGS. 4 and 5, there is a driven shaft 63 having a sprocket 64 thereon and another sprocket 65. An endless chain 66 connects the sprocket 65 with a sprocket 67 on a shaft 68 in a gear box. Through the gearing in said box, gears 69 and sprockets 69' are driven which are connected by endless chains 70 with sprocket wheels 71 on shafts 72. The latter drive the feed rolls 73 which pull the web from the former and through the vertical rolls 73', the drive for the knives 74 being off of the same transmission train through gears 100 and 101.

The knives 74 are suitably supported for rotation in vertical position, the one having a vertical knife 75 with opposite blades and the other having oppositely disposed vertical knife-receiving slots 76 whereby the web is periodically severed by the action of a knife blade 75 entering a slot 76, which is so timed by the electric eye mechanism 48 of FIG. 2, responsive to the web spots 47, as to take place between sponges.

The separated packages 82 from the knives pass on to a horizontal endless belt 77 (FIG. 4) while standing upright and they travel between the pair of endless feed belts 78 which support the packages on both sides while in upright position and convey them to the position shown in FIG. 6, which is within the upright compartment 79 (see FIG. 1). Here, each package 82 standing on edge is gripped between upwardly-moving stretches of endless belts 80 and 81, as shown in FIG. 20. These belts cause the individual packages 82 to move upwardly as fast as they are fed to the belts by the bottom-supporting belt 77 and by the belts 78. The upwardly-moving packages 82 may then be passed between sets of end folders 83. These are of the construction illustrated in application of Thomas R. Harrison and Robert A. Pratt, Serial No. 13,869, filed March 9, 1960, now Patent No. 3,054,242 and they serve to simultaneously make drug folds on the opposite cut ends of the package and to glue the drug folds in position to close the package ends. The packages 82 are then delivered one after another to the curved guide plate 84 (see FIG. 20) which directs them in a downward direction between the downward stretch of belt 81 and a metal guiding band 85 from which the packages are dropped one after another onto an endless belt 86 at the side of the apparatus, as shown in FIG. 1, the finished packages 82 being shown thereon.

The type of package shown in FIGS. 2, 7, 8 and 10, wherein there are the single, upright flanges 43, may have the portions of the flaps 43 of FIG. 8, which face one another, adhesively connected at any convenient time. Adhesive may be applied in any suitable way to one of the flap faces just before it enters the former 59, or the web may be pre-formed with a strip of pressure-sensitive latex on the back side of the material which is to form the flaps 43 as at 87 (FIG. 11). This strip of adhesive is a type which will only adhere to itself and is applied to both flanges and will serve to adhesively connect the flanges during forming of the package in the former 59. In lieu of the device 83 of FIGS. 6 and 20 for closing the ends of

the package by means of doubled-over, adhesively-connected drug folds, as in FIG. 12, the ends may be closed at any suitable time merely by the use of adhesive without the end folds.

Another form of package which may be formed on the apparatus of the present invention is illustrated in FIGS. 13, 14, 15 and 16. This package has not only the down-turned flanges 243, but also up-turned extensions therefrom as at 244, as shown in FIG. 15, which are adapted to be adhesively connected to each other. To make this type of package the first folds 244 must be made before the web reaches the former 45 or 145 of FIGS. 18 or 19. The result will be that the former 45 or 145 will cause the web to be flanged to the condition shown in FIG. 14, wherein there are up-turned flanges 243 and down-turned flanges 244. This view is otherwise the same as FIG. 7, but FIG. 7 shows a package with a simple form of edge flange.

To make the package of the type shown in FIG. 15, the web, before it reaches the former 45, is preferably provided with upwardly facing strips of pressure-sensitive latex adhesive thereon, as shown in FIG. 13, the adhesive being of a type which adheres only to itself. Here the portions of the web which are to form the flanges 245 will have strips of adhesive 246 on both of the flanges in order to make the final adhesive connection between the facing portions of the flaps 244 of FIG. 15. There will also be pre-formed, transverse lines of adhesive 247 which can be pressed together at or after the time of cut-off to seal the ends of the packages to produce the final package shown in FIG. 16.

As another modification, heretofore mentioned, in lieu of loading two transversely aligned surgical pads, as in FIG. 2, a single-length pad 251 may be laid in to extend across the two sides of the web. Then, when the web is folded in the V-form of FIG. 17, the double-length pad will be simultaneously folded transversely around a rod 252 to produce a package the same as FIG. 12, except there will be one double-length item rather than two superimposed items.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What we claim is:

1. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned, means for gradually urging the moving web into V-shape with the axis of the V on the longitudinal center line of the web and with an article portion on each side of said center line, means for urging said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween, and means for thereafter severing the juxtapositioned web portions between the articles.

2. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned, means for gradually urging the moving web into V-shape with the axis of the V on the longitudinal center line of the web and with an article portion on each side of said center line, means for urging said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween, and means for thereafter severing the juxtapositioned web portions between the articles, said means for forming the web into a channel-shaped cross section including means for guiding the web from an elevated position to a lower position, and including forming means acting on said web in said lower position.

3. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned, means for gradually urging the moving web into V-shape with the axis of the V on the longitudinal center line of the web and with an article portion on each side of said center line, means for urging said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween, and means for thereafter severing the juxtapositioned web portions between the articles, said means for forming the web into a channel-shaped cross section including means for guiding the web from an elevated position to a lower position, and including forming means acting on said web in said lower position, the height difference between said elevated position and lower position being approximately equal to the height of the flanges to be formed.

4. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned, a substantially horizontal support for said channel-shaped portion, means for gradually urging the moving web into V-shape with the axis of the V on a longitudinal line intermediate the width of the web and with an article portion on each side of said longitudinal line, means for urging said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means supported a predetermined distance below said horizontal support for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween to form an upright enclosure, and means for thereafter severing the juxtapositioned web portions between the articles to form packages.

5. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned, a substantially horizontal support for said channel-shaped portion, means for gradually urging the moving web into V-shape with the axis of the V on a longitudinal line intermediate the width of the web and with an article portion on each side of said longitudinal line, means for urging said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means supported a predetermined distance below said horizontal support for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween to form an upright enclosure, said predetermined distance being approximately equal to the height of said upright enclosure, and means for thereafter severing the juxtapositioned web portions between the articles to form packages.

6. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned one on each side of the web, means for gradually urging the moving web into V-shape with the axis of the V on the longitudinal center line of the web and with articles on each side of said center line, means for urging said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween, means for thereafter severing the juxtapositioned web portions between

the articles to form packages, and means for causing sealing of said packages.

7. In a continuous packaging machine having means for continuously feeding a flat web of sheet material, means for forming said web into a channel-shaped cross section with upstanding flanges between which relatively flat articles to be packaged are adapted to be positioned one on each side of the web, means for gradually urging the moving web into V-shape with the axis of the V on the longitudinal center line of the web and with articles on each side of said center line, a series of fingers supported in such a position as to progressively urge said flanges inwardly toward one another and then downwardly over portions of the relatively flat articles, means for thereafter bringing opposite portions of the web into juxtaposition with the articles therebetween, means for thereafter severing the juxtapositioned web portions between the articles to form packages, and means for causing sealing of said packages.

8. In a continuous packaging machine having means for guiding a moving web of sheet material, means for forming said web into channel-shape in cross section with upstanding oppositely-disposed side flanges, a support over which said flanged channel-shaped web is guided, and forming means spaced a substantial distance forwardly of said support for forming opposite sides of the web into juxtaposition with articles therebetween, the position of said forming means being such that the web travels downhill from said support to said forming means, and means engageable with said web for controlling the transition from channel shape into gradually

closing V-shape and for acting on said flanges before the web reaches said forming means to fold said flanges downwardly over article portions.

9. In a continuous packaging machine having means for guiding a moving web of sheet material, means for forming said web into channel shape in cross section with upstanding oppositely-disposed side flanges, a rotatably-supported guiding roller over which said flanged web is guided, and upright forming means spaced a substantial distance forwardly of said roller for forming opposite sides of the web into juxtaposition with articles therebetween, the position of said forming means being such that the web travels downhill from said guiding roller to said forming means, and means including fingers engageable with the web for controlling a transition from channel-shape to a gradually closing V-shape and for acting on said flanges before the web reaches said forming means to fold said flanges downwardly over article portions.

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FRANK E BAILEY, *Primary Examiner.*

ROBERT A. LEIGHEY, *Examiner.*