MACHINE FOR FORMING, PACKING, AND SEALING CONTAINERS

Harry F. Waters, New York, N. Y.

Application July 9, 1949, Serial No. 109,510

15 Claims. (Cl. 93—3)

This invention relates to new and useful improvements in a machine for manufacturing containers, and particularly containers of the envelope type.

One object of the present invention is to double the capacity of the machine by the use of a single container forming web manipulated so that upon each side of the longitudinal medial line thereof one container is formed, so that in the final operation two lines instead of one line of containers are formed, heat-sealed, filled, and separated both transversely and longitudinally.

The invention includes a method as well as means for forming a continuous web into an accordion pleats or a W-formation, maintaining the top edges of the formed web in open formation, inserting food-stuffs or materials into the adjacent paired grooves formed in the folded web, bringing the two outer single edges and the center double edge of the web together in closed relation, heat-sealing the formed web transversely and intermittently at spaced areas and then severing the continuous web of joined filled envelope containers, to provide a plurality of filled containers.

Hereinbefore, envelope containers were manufactured in such a manner that a series of joined envelopes could be formed in a single row. By the use of my invention a plurality of side-by-side continuous rows of joined envelope containers can be manufactured from one or more continuous webs with a very slight change in the machine now in use.

Other and further objects of this invention will become apparent from a reading of the following specification in connection with the accompanying drawings in which:

Fig. 1 is a diagrammatic top plan view of such a machine; and,
Fig. 2 is a side view of the machine; and,
Fig. 3 is a cross-sectional view along the lines 3—3 of Fig. 2; and,
Fig. 4 is a cross-sectional view along the lines 4—4 of Fig. 2; and,
Fig. 5 is a cross-sectional view along the lines 5—5 of Fig. 2; and,
Fig. 6 is a diagrammatic cross-sectional view showing a joined envelopes; and,
Fig. 7 is an end view of two modified joined envelopes; and,
Fig. 8 is a top plan view of Fig. 7; and,
Fig. 9 is a diagrammatic view showing the filling, vacuuming, longitudinal and transverse severing station; and,
Fig. 10 is a view along the lines 10—10 of Fig. 9; and,

Fig. 11 is a view along the lines 11—11 of Fig. 9; and,
Fig. 12 is a view along the lines 12—12 of Fig. 9.

Referring now to the various figures of the drawings for a preferred embodiment of my invention it will be seen that Fig. 1 is a diagrammatic top plan view of a machine for manufacturing envelopes showing a roll of paper from which a continuous web passes between feed rolls. After this web leaves the feed rolls it is then guided into a former plate made of two members 11 and 11a. This former plate forms the web into a W-formation as is illustrated in Fig. 3. After leaving the former plate the formed web then passes between rotary elements 12 and 13 which serve to maintain the W-formation and to keep the paper edges of the W-formed web in open position. After leaving elements 12 and 13, which are for maintaining the folded web in open position, the web then passes beneath the hopper 14. This hopper 14 is adapted to feed food-stuffs or other materials into both of the adjacent longitudinal grooves formed in the web by the former plate. After a predetermined amount of material or food-stuffs has been fed into the W-formed web, the web then passes into a closer plate 15 which is adapted to close the upper edges of the W-formed web.

After leaving the edge closing means 16 the web then passes between a plurality of transverse and longitudinal heat-seal bars. These heat-seal bars are adapted to close the formed filled web transversely and longitudinally. After the web has been thus filled, filled and sealed we then have a plurality of joined heat-sealed filled envelopes or containers. These joined envelopes then pass into a cutting or severing station where the envelopes are cut both longitudinally and transversely into a plurality of single, filled, sealed envelopes.

In Fig. 2 there is shown a side view of the machine illustrated in Fig. 1. In this view it will be seen that the machine is slanted somewhat down from the horizontal. The purpose of this is so that when material is fed from hopper 14 into the adjacent grooves of the W-formed web the material will be inclined to travel downwardly toward the transverse heat-seal area 18. As shown in Fig. 2 the heat-seal bar is an L-shaped heat-seal having two heat-seals for transversely heat-sealing the web with a space therebetween. While I have shown an L-shaped heat-seal it should be understood that I can employ a vertical heat-seal of sufficient width that the cutting knives can sever the envelopes along the heat-
seal leaving at the same time a heat-seal for each of the severed envelopes. It should be understood that while I have shown the machine as inclined from the horizontal that the machine can be run on a horizontal plane with the hopper feeding material into the grooves formed by the W-formation with the vertical heat-sealing means above mentioned.

After the vertical or transverse heat-sealing has been accomplished and after the material has been inserted into the joined envelopes I can then heat-seal the top of the envelope by means of a horizontal or longitudinal heat-seal. The advantages, however, of utilizing the L-seal shown in Fig. 2 is that one application of the heat-seal bar will seal one transverse or vertical section of one bag at the same time that it is sealing the longitudinal or horizontal side of the same bag while at the same time it is closing the open transverse portion of the preceding envelope or bag.

The machine shown in Figs. 1 and 2 is also adaptable for operation in a vertical position with the web 10 coming from a roller at the top of the machine and then descending into a former plate beneath which is located the elements 12 and 13 for maintaining the W-formation beneath which the hopper can then feed material or food-stuffs into the W-formed web which then passes into the edge closing member 15 beneath which is positioned the L-shaped heat-seal bar 18. After the L-seal has been applied it will be observed that an open mouth bag or container has been formed which is folded at one side heat-sealed at the opposite side and heat-sealed at the bottom.

When the hopper 14 feeds the contents into the W-formed web the contents will drop down to the transverse heat-seal 18. After a predetermined amount of material or food-stuffs has been fed into the W-formed web the web will then travel down an additional bag length. The open mouth bag is shown at A in Fig. 3. After the L-sealed bag A has been filled as heretofore described it will then pass to the position B also shown in Fig. 3. In this position it will be noted that the application of the L-seal closes the open mouth of the bag B while at the same time heat-sealing the bottom and side of bag A. The joined bags will then travel through a cutting station where they will be severed longitudinally and transversely. The transverse cutting will be along the line 19 which is between the transverse heat-seals of the joined envelopes. The longitudinal severing will sever the W-formed web at a line indicated at 31 in Fig. 3, Fig. 5 and Fig. 8.

Fig. 3 which is a cross-sectional view along the lines 3-3 of Fig. 2 and shows the two sections 11, 11a of the former plate and shows the folded web 10 in W-formation.

Fig. 4 which is a cross-sectional view along the lines 4-4 of Fig. 2 shows the means 12, 13 for maintaining the W-formed web in open position for ease in filling. In Fig. 4 it will be noted that the means shown consists of a plurality of convex shaped rotary elements 12 rotatable about an axis 12a and a plurality of concave shaped rotary elements which are positioned beneath the web 10 in alignment with the convex shaped members 12. In this manner element 12 and element 13 cooperate with each other to maintain the edges of the top portion of the W-formed web in open relation.

Fig. 5 which is a cross-sectional view along the lines 5-5 of Fig. 2, shows the edge closing means 15 through which the open W-formed web passes. As it passes through this closing means the top edges are brought together in closed relation. As shown in Fig. 5 this closing means consist of a L-shaped element having two juxtaposed grooves 15a, 15b with the top portion thereof having an opening 15c formed therein through which the top edges of the W-formed web pass. If this opening 15c is narrow as illustrated in Fig. 5 the top edges of the W-formed web will, of course, be brought into close contact.

Fig. 6 is a diagrammatic illustration of the two formed bags 21 in cross-section showing the heat-seal 21a which is the longitudinal heat-seal which can be used to close the bags.

Fig. 7 is an end view of two formed, filled, sealed bags or envelopes 21. It will be noted in Fig. 7 that a space 19 is provided between the heat-seals 21a.

Fig. 8 is a top plan view of Fig. 7 showing the longitudinal heat-seals 21a and the transverse heat-seals 29 with the envelopes joined together at 31.

Fig. 9 is a diagrammatic view of the same apparatus showing a plurality of bags 21 joined together by transverse heat-seals 29 and passing under a plurality of hoppers 14. These hoppers can feed into the envelopes 21 different materials or food-stuffs. After the envelopes have been formed, transversely heat-sealed and filled the envelopes can then pass beneath a vacuum producing apparatus 22 at which station the filled envelopes may be vacuumed and then sealed after which the envelopes can then pass to a longitudinal cutter 28 and a transverse cutter indicated by the dotted lines in Fig. 9.

Fig. 10 is a cross-sectional view along the lines 10-10 of Fig. 9. In Fig. 10 there is shown the transverse heat-seal members 24. The W-formed web is shown at 10. Positioned beneath the W-formed web in the exterior groove of the said formed web is a resilient backing member or heat-seal limiting strip 25 for cooperation with the heat-seal members 24 and to prevent the heat from each heat-sealing member from extending beyond the adjacent side of the center ridge 31. While these members 25 are closed position which is in the direction of the arrows shown in Fig. 10 they will press the envelope ends against the resilient member 25 to form a transverse heat-seal. Thus by this arrangement the container size is established and the containers in this instance are sealed at one time and independently of each other.

The transverse heat-seal so formed is the heat-seal 29 of Fig. 9.

Fig. 11 shows a cross-sectional view along the lines 11-11 of Fig. 9. In this Fig. 11, it will be seen that the transverse heat-seals have already been applied to the W-formed web to produce a plurality of joined envelope sections open at the top. Through this open top food-stuffs from hoppers 14 can be fed into these envelope sections.

In Fig. 12 there is shown a cross-sectional view of Fig. 9 along the lines 12-12. In this Fig. 12 it will be seen that the filled envelope sections are ready to have a vacuum drawn thereon. Any standard vacuum nuzzle 23 attached to a standard or conventional vacuum producing apparatus can be positioned above the filled envelope sections. The resilient backing member 25 is positioned from below in the center ridge or groove 31 be-
3,585,444

benn the envelope sections. Positioned immediately above this resilient member 25 is another resilient member 26 adapted to cooperate with the vacuum nozzles 22 and the members 28 so that when the nozzle 22 is positioned downwardly in the envelope sections the top edges of the envelope sections can be closed off from the atmosphere by the members 26 pressing inwardly against the vacuum nozzle 22 the tapering edges of which are pressed against the resilient member 26 to seal off the envelope sections from the atmosphere and to permit the drawing of a vacuum on the said envelope sections and their contents. After the vacuum has been drawn these envelope sections are then heat-sealed longitudinally at the top thereof through the medium of the sealer 21. After the vacuum has been drawn and the envelope sections have been sealed said envelopes then pass to a cutting station 40, Fig. 1, where they are severed from each other both transversely and longitudinally through the ridge 31.

It will thus be seen that I have provided a new and novel method and means for manufacturing from a single web a plurality of individual vacuum packaged, filled, heat-sealed containers; and, I have provided a new and novel way to double, or more, the capacity of the machine from one or more continuous webs of material in less time on the same machine than heretofore required. It should also be understood that while I have shown a W-formed web that I can provide a former plate which will form a plurality of grooves in a single web so that any number of rows of joined bag sections may be formed. To increase the production of the machine from two rows of joined bag sections, four, five or any other number desired is merely a matter of adding an additional number of grooves in the formed web.

It will thus be seen that by cresting the web longitudinally to produce accordin like plains transversely, that the ridge 31 of the pleat and the two edges of the web provide the closures for two side-by-side containers or envelopes, and thus a second or additional closure sheet or web is not necessary.

Having disclosed a preferred embodiment of my invention I will now proceed to point out in the claims what desire to secure by Letters Patent, it being understood that various changes and modifications in the details and structure of the preferred embodiment may be made without departing from the spirit of the invention when defined by the appended claims.

What I claim is:

1. In a machine for manufacturing containers, in combination, a former plate, means including a former plate adapted to form a continuous web into a substantially W-formed web to produce continuosly joined envelope sections, longitudinal heat-seal bars effective to heat-seal simultaneously the open portions of said joined envelope sections in combination, means including a former plate adapted to form a continuous web into a substantially W-formed web, means to keep the edges and center ridge thereof separate from each other for a predetermined distance, a hopper said hopper positioned adjacent the open portion of said folded web, means to bring each free edge and the respective adjacent portions of the sides together, a resilient backing over which the ridge rides, transverse heat-seal bars adapted to heat-seal each edge to its adjacent portion of the ridge of the web to form a series of joined envelope sections, a vacuum producing means, said vacuum producing means adapted to produce vacua in said envelope sections, and longitudinal heat-seal bars also adjacent said backing, said longitudinal heat-seal bars longitudinally heat-sealing the edges of the envelope to their adjacent sides of the ridge of the web of the envelope sections with said vacua maintained in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely to define a plurality of individual envelopes.

2. In a machine for manufacturing containers, in combination, a former plate, said former plate adapted to form a continuous web into a substantially W-formed web, means to keep the edges and center ridge thereof separate from each other for a predetermined distance, a hopper said hopper positioned adjacent the open portion of said folded web, means to bring each free edge and the respective adjacent portions of the sides together, a resilient backing over which the ridge rides, transverse heat-seal bars, said heat-seal bars adjacent said backing adapted to heat-seal each edge to its adjacent portion of the ridge of the web of said W-formed web to form a series of joined envelope sections, vacuum producing means juxtaposed to said W-formed web, said vacuum producing means adapted to produce vacua in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely.

3. In a machine for manufacturing containers, in combination, a former plate, said former plate adapted to form a continuous web into a substantially W-formed web, means to keep the edges and center ridge thereof separate from each other for a predetermined distance, a hopper said hopper positioned adjacent the open portion of said folded web, means to bring each free edge and the respective adjacent portions of the sides together, a resilient backing over which the ridge rides, transverse heat-seal bars, said heat-seal bars adjacent said backing adapted to heat-seal each edge to its adjacent portion of the ridge of the web of said W-formed web to form a series of joined envelope sections, vacuum producing means juxtaposed to said W-formed web, said vacuum producing means adapted to produce vacua in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely.

4. In a machine for manufacturing containers, in combination, a former plate, said former plate adapted to form a continuous web into a substantially W-formed web, rotary means to keep the edges and ridge thereof separate from each other for a predetermined distance, a hopper said hopper positioned adjacent the open upper portions of said folded web, means to bring said edges and adjacent portions of the ridge together, a resilient backing over which the ridge rides, transverse heat-seal bars, said heat-seal bars adapted to heat-seal the respective edges and ridge of said continuous W-formed web intermitently to form two rows of joined envelope sections, vacuum producing means juxtaposed to said W-formed web, said vacuum producing means adapted to produce vacua in said envelope sections, and longitudinal heat-seal bars, said longitudinal heat-seal bars adapted to heat-seal the open longitudinal edges and adjacent portions of the ridge of the web while said vacua is maintained in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely.
said sealed envelope sections longitudinally and transversely.

5. In a machine for manufacturing containers, in combination, a former plate, said former plate adapted to shape a continuous web into a formation defining substantially parallel longitudinal grooves, means to keep the walls of said grooves separate from each other for a predetermined distance, a hopper, said hopper adapted to feed package contents into the open grooves of said folded web, means to bring said edges together, a resilient backing to fit beneath and into the ridges of the grooves, transverse heat-seal bars adjacent said backing, said heat-seal bars adapted to heat-seal the edges and ridge of said W-formed web to form a series of side-by-side joined envelope sections, vacuum producing means, said vacuum producing means adapted to produce vacua in the formed envelope sections, longitudinal heat-seal bars adjacent said backing, said longitudinal heat-seal bars adapted to heat-seal the longitudinal edges and adjacent portions of the ridges of said joined envelope sections after a vacuum has been drawn on said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely to define a plurality of individual envelope containers.

6. In a machine for manufacturing containers, in combination, a former plate, means including said former plate adapted to form a continuous web into a substantially W-formation, separate means over which the W-formed portion rides and to keep the convolutions thereof separate from each other for a predetermined distance, means to bring said edges together, a resilient backing over which the ridge rides, heat-seal bars, said heat-seal bars being adjacent the backing and adapted to heat-seal the edges of the web to the adjacent portions of the ridge web to form a series of joined envelope sections, vacuum producing means juxtaposed to said open W-formation, said vacuum producing means adapted to produce vacua in said envelope sections, heat-sealing means to close the envelopes, and means for severing said sealed envelope sections longitudinally and transversely.

7. In a machine for manufacturing containers, in combination, a former plate, said former plate adapted to form a continuous web into a substantially W-formation, separation means to keep the edges thereof separate from adjacent portions of the ridge of the groove over which the W-formation rides for a predetermined distance, means to bring said edges together, a backing over which the web rides, transverse heat-seal bar adjacent said backing, said heat-seal bars adapted to heat-seal the free edges and adjacent portions of the ridge of said continuous web intermittently to form a series of joined envelope sections, vacuum producing means juxtaposed to said W-formation, said vacuum producing means adapted to produce vacua in said envelope sections, means for shutting off said vacuum producing means, and means for severing said sealed envelope sections longitudinally and transversely.

8. In a machine for manufacturing containers, in combination, means including a former plate, adapted to form a continuous web into a substantially W-formation, means to keep the edges and adjacent portions of the ridge thereof separate from each other for a predetermined distance, a hopper, said hopper positioned above the open portions of said folded web, means to bring said edges together, a backing over which the ridge rides, transverse heat-seal bars adjacent said backing, said heat-seal bars adapted to heat-seal transversely the edges and adjacent portions of the ridge of said continuous web intermittently to form a series of joined envelope sections, vacuum producing means, said vacuum producing means adapted to produce vacua in said envelope sections, and longitudinal heat-seal bars, adjacent said backing, said longitudinal heat-seal bars adapted to longitudinally heat-seal the edges to the adjacent portions of the ridges of said joined envelope sections with said vacua maintained in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely to define a plurality of individual envelopes said last named means to be positioned at least two envelope lengths in advance of said transverse heat-sealing bars.

9. In a machine for manufacturing containers, in combination, a former plate, said former plate adapted to form a continuous web into a substantially W-formation, means including rotary convex and rotary concave cooperating elements to keep the edges and the ridge thereof separate from each other for a predetermined distance, means to bring said edges and the adjutment portions of the ridge together, a backing over which the ridge rides, transverse heat-seal bars adjacent said backing, said heat-seal bars adapted to heat-seal the edges and adjacent portions of the ridge of said continuous web intermittently of said W-formed web to form a series of joined envelope sections, vacuum producing means juxtaposed to said W-formation, said vacuum producing means adapted to produce vacua in said envelope sections, means for shutting off said vacuum producing means, and longitudinal heat-seal bars, adjacent said backing, said longitudinal heat-seal bars adapted to heat-seal the remaining free edges and adjacent portions of the ridge of said joined envelope sections while said vacua is maintained in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely.

10. In a machine for manufacturing containers, in combination, a former plate, means including said former plate adapted to form a continuous web into a formation defining a plurality of longitudinal accordion pleat like grooves, means to keep the walls of said grooves separate from each other for a predetermined distance, a backing upon the opposite side of the web of said last means, transverse heat-seal bars adjacent said backing, said heat-seal bars adapted to intermittently heat-seal the edges of the grooves to the ridge thereof to form a series of joined envelope sections, longitudinal heat-seal bars, adjacent said backing, said longitudinal heat-seal bars adapted to heat-seal the edges and adjacent portions of the ridge of said joined envelope sections while said vacua is maintained in said envelope sections, and means for severing said sealed envelope sections longitudinally and transversely.

11. A machine for manufacturing containers, in combination, a former plate, said former plate adapted to shape a continuous web into a formation defining substantially parallel lon-
A container making machine including in combination a web supply, means for forming a pair of longitudinal grooves with a center ridge and two free edges, material feeding means for delivering material into both grooves simultaneously, means for simultaneously heat-sealing the formed web into two containers at a time, and two independent means for simultaneously severing the sealed portions into individual containers.

14. A container making machine as claimed in claim 13 wherein means for simultaneously heat-sealing the formed web consists of a transverse seal and a seal that closes the respective edges and the longitudinal ridge at the mouth of the container.

15. A container making machine as claimed in claim 13 wherein the means for simultaneously severing the sealed containers is a cutter that sever the two containers through the ridge connecting the two.

HARRY F. WATERS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,139,029</td>
<td>Saltisberg</td>
<td>Dec. 6, 1938</td>
</tr>
<tr>
<td>2,272,520</td>
<td>Patterson</td>
<td>Feb. 10, 1942</td>
</tr>
<tr>
<td>2,334,256</td>
<td>Eaton</td>
<td>Nov. 16, 1943</td>
</tr>
<tr>
<td>2,384,492</td>
<td>Rebechini</td>
<td>Sept. 11, 1945</td>
</tr>
<tr>
<td>2,387,812</td>
<td>Sonneborn et al.</td>
<td>Oct. 30, 1945</td>
</tr>
<tr>
<td>2,497,212</td>
<td>Donofrio</td>
<td>Feb. 14, 1950</td>
</tr>
</tbody>
</table>
Certificate of Correction

August 21, 1951

Patent No. 2,565,444

HARRY F. WATERS

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 8, line 66, for "bars, adjacent backing" read bars adjacent said backing;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of January, A. D. 1952.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.