July 6, 1948. H. F. WATERS 2,444,685

MULTIPLE FABRICATION METHOD AND APPARATUS FOR LIQUID-TIGHT ENVELOPE BAGS

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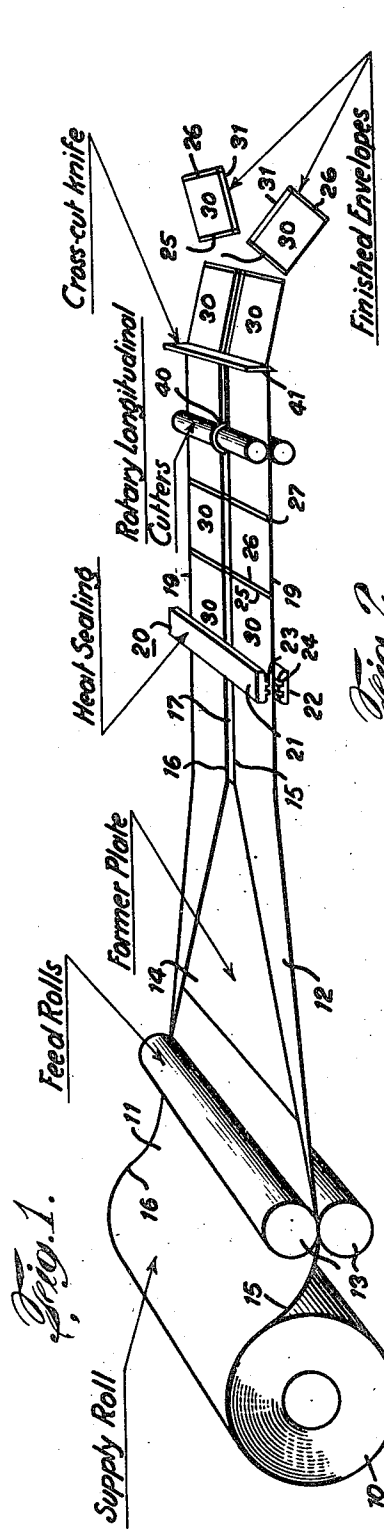

Fig. 1.

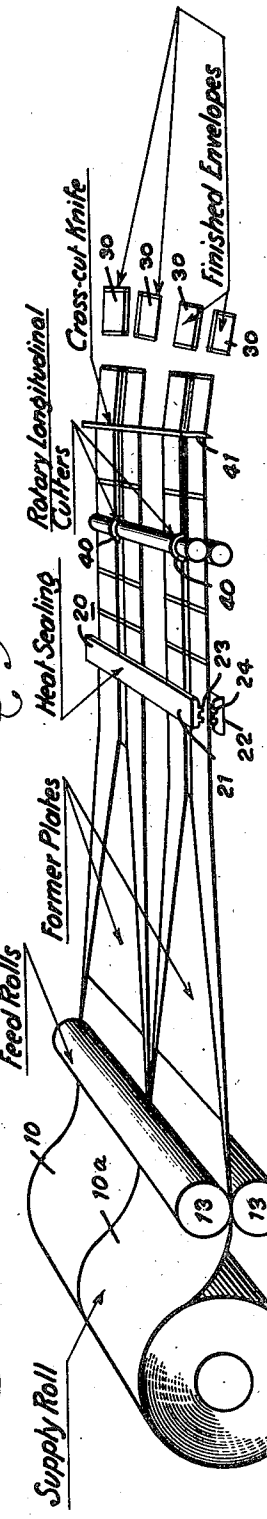

Fig. 2.

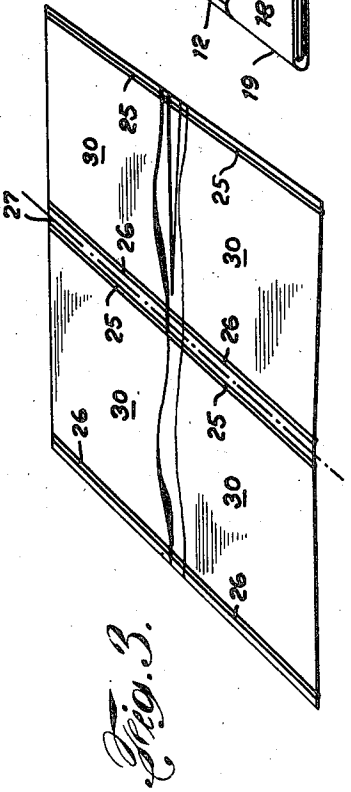

Fig. 3.

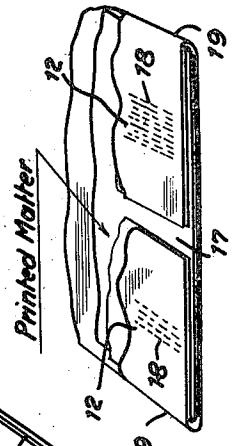

Fig. 4.

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MULTIPLE FABRICATION METHOD AND APPARATUS FOR LIQUID-TIGHT ENVELOPE BAGS

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5 Claims. (Cl. 93—18)

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This invention relates to improvements in methods of forming envelope bags, and more particularly to bags having thermoplastic-lined inner faces secured at marginal edges by heat seals of special cross-section and automatically fabricated from continuous webs of sheet material in multiple units.

In my prior Patents Nos. 2,252,106, of August 12, 1941; 2,252,105 of August 12, 1941; 2,223,754, of December 3, 1940, and applications Serial No. 343,926, filed July 5, 1940 issued as Patent No. 2,316,919 April 30, 1943; Serial No. 421,790, filed December 5, 1941 issued as Patent 2,432,052, Dec. 2, 1947; Serial No. 421,791, filed December 5, 1941, now abandoned; Serial No. 423,424, filed December 18, 1941 issued as Patent 2,412,547, Dec. 10, 1946; Serial No. 421,920, filed December 6, 1941 issued as Patent No. 2,412,546, Dec. 10, 1946; and Serial No. 438,270, filed April 9, 1942, there have been disclosed methods for the manufacture of heat-sealed envelope bags. These methods are essentially directed to the utilization of web material and the formation of single series or units of the finished product. These procedures, while practical, are not of sufficient operative speed to render the output commercially available for the multiple uses to which they are suited.

It is a feature of novelty of the present invention to provide a method for the multiple fabrication of a plurality of series of heat-sealed envelope bags from continuous webs of material.

These and other desirable features and advantages of the present invention will be described in the specification and illustrated in the accompanying drawings, certain preferred modes of operation being illustrated, by way of example only, for, since the underlying procedural features may be utilized with other materials, it is not intended to be limited to the features here shown, except as such limitations are clearly imposed by the appended claims.

In the drawings like numerals refer to similar parts throughout the several views, of which

Fig. 1 is a schematic view showing, diagrammatically, the processing of a plural folded web to form multiple bag sections;

Fig. 2 is a view similar to Fig. 1 showing the processing of a plurality of webs;

Fig. 3 is a detail of a folded and sealed web indicating the multiple envelope formation prior to severing into individual envelopes, and

Fig. 4 is a broken section of the forming web of Fig. 1 indicating one manner of applying printing thereto.

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As intimated hereinabove, and described and claimed in my patents and applications, bag envelopes are made by folding appropriately sized blanks of thermoplastic-faced sheet material, either longitudinally or transversely, with the thermoplastic faces inward, and sealing the appropriate marginal edges by heat seals. In such cases, there has been disclosed a continuous method wherein a single series or line of envelopes is formed, transversely sealed, and cut. However, as already noted, such a method is not of sufficient production speed to enable the full utilization of the novel bag envelopes.

The difficulty is overcome according to the practices of the present invention, in a manner now to be described:

Referring more particularly to Fig. 1, a supply roll 10, of web material, having a thermoplastic-faced surface 11, mounted on a web or back 12, is fed through a pair of feed rolls, 13, to a former plate, or folder 14, where the edges 15, 16 of the sheet are folded inwardly toward the longitudinal center of the forwardly traveling web. After leaving the former plate, the web may have printing matter 18 applied thereto, as indicated at Fig. 4. The traveling web now passes under a heat sealing device 20, comprising a heat sealing member 21 and cooperating anvil or backing member 22, provided with a plurality of mating tongue and groove elements 23, 24 which form spaced, parallel, transverse heat seals 25, 26, across the web, and define a groove 27 therebetween. The cooperating faces of the heat sealing member 20 are generally slightly curvilinear to give the improved internal V-seal or dam, more particularly shown and described in my application Serial No. 442,528 filed May 11, 1942, issued as Patent 2,437,057, March 2, 1948.

After the transverse heat seals have been formed, it is to be noted that a continuous series of pairs of opposed bag envelopes 30 are formed on the web, and that the respective transverse seals 25, 26 of successive envelopes of the series are separated by spacing areas 27. The envelopes are folded around the now exterior edges 19 of the web, and the inner fold lines or edges define a space 17 therebetween. The advancing web of now-formed, continuous series of multiple bag sections passes through a rotary longitudinal cutter 40, which splits the web centrally of the intermediate space 17, to define two separate advancing webs of joined envelopes. The now separated webs of joined envelopes are advanced further by several envelope-lengths, as shown, to a cross-cut knife 41, which severs the

plurality of webs along the transverse guide or spacing lines **27** of the advancing or leading pair of envelopes of the webs, to sever and form the separate individual bags or envelopes **30**, which are then packaged or formed up or utilized in any suitable manner.

The advancement of the webs of joined bag sections, by a plurality of bag lengths, as shown in Figs. 1 and 2 of the drawings, before longitudinally slitting the web to form two separate webs of joined bag sections, and the severing or cutting off of the forward or leading bag sections of each web by a cross-cut knife or the like, operating in synchronism with the apposition of the heat-sealing bars, has several important implications bearing on the operative procedure and particularly on the method of forming the finished bag structures. It will be appreciated that in a heat-sealing operation, as disclosed herein, the fusion of juxtaposed fusible surfaces in the seam area, weakens the web structures in that area. It will be appreciated further that the interfused seam surfaces require time for coalescence and setting to a firm, solid seal. By the provision of the groove or unsealed area or section **27**, spacing immediately adjacent heat-seals **25**, **26**, and by the further provision of advancing the webs of joined envelopes, at least a plurality of envelope lengths, before severing the leading envelopes from the web along line **27**, the interfused thermoplastic of the seam areas of the leading envelopes will have had a sufficient time to assume a permanent set. Even with stepwise or intermittent advance of the transversely seamed, webs, the forward or throughput speeds of the products herein will be based on a "dwell," or heat-sealing period of time, of the order of ⅔ of a second. The opening and closing of the heat-sealer jaws on the next succeeding area to be sealed will require another ⅓ of a second, giving a total heat-sealing cycle time of 1 second. Such a cycle permits the sealing of some 60 joined bag sections, of the respective webs, per minute. However, the fused thermoplastic in any freshly heat-sealed area requires at least a second or more of setting time to attain structural homogeneity. Consequently, there must be an advance of the webs of joined envelopes amounting to at least two envelope lengths, before transverse cutting or severing of the envelopes in the inter-seam area, along cutting line **27**, is effective. Cutting the next successive freshly, sealed seam ahead of or immediately in front of the presently forming heat-seal, distorts and upsets the seal before it has time to set, and such a disrupted or imperfect seal always leaks. The operative features described above effectually preclude the formation of leakers.

While a dual web of envelopes has been shown formed according to Fig. 1, the number of webs may be increased, at will, as shown in Fig. 2, and the necessary equipment increased in size, if desired. Thus, where a given machine might take two rolls **10**, **10a** of material to form relatively small bags, as shown in Fig. 2, the same machine might take only one roll to form larger bags of the type indicated in Fig. 1. Where real small bags were to be made it will be appreciated that two or more webs or rolls of suitable size could be utilized on a single machine.

It will be now appreciated that there has been provided a novel method and apparatus for automatically forming a plurality of series of bag envelopes from one or more webs of bag material, which method and apparatus includes, in sequential steps, the opposed or dual formation of parallel bag sections from single or multiple webs, which infolded bag sections are transversely heat sealed with spaced heat-seals forming internal V-seams or dams, and which continuous web of multiple rolls of envelopes is slitted, and then transversely cut to separate the formed envelopes.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. The method of forming flat-folded envelope pouches comprising advancing a web of plural-ply thermoplastic-faced envelope material over a former plate to define two parallel rows of folded-over sections having the free edges adjacent but spaced; intermittently advancing the bi-folded web to a heat-sealing station and applying a series of spaced, transverse heat seals, in multiple, to the web, to form a continuous series of pairs of bag envelopes having a common continuous side; slitting the transversely sealed web along the central longitudinal slot to form a pair of continuous webs of joined bag envelopes, and thereafter transversely cutting the said webs a plurality of envelope-lengths ahead of the heat-sealing station and between the said several transverse seals defining the leading pair of envelopes to separate the individual envelopes simultaneously with the intermittent heat-sealing step.

2. A method of forming envelope containers having inner thermoplastic faces, comprising advancing a web of plural-ply thermoplastic envelope material over a former plate to define a pair of infolded parallel rows with the free edges in juxtaposition; intermittently heat-sealing the double rows transversely with spaced series of double heat seals to form continuous webs of bag envelopes, slitting the webs longitudinally and then transversely of a pair of bag envelopes at least two envelope lengths in advance of the heat-sealing station and centrally of the double heat seals simultaneously with the intermittent heat-sealing step.

3. An apparatus train for forming flat-folded bag envelopes, comprising a supply roll, means for withdrawing a continuous web from the supply roll, a former plate disposed forwardly of the feed rolls, and including means to fold the edges of the advancing web inwardly of the plate to define a pair of marginal folds having a continuous bottom and a longitudinal top gap; nonrotary heat sealing means disposed transversely of the path of the advancing web, and intermittently operative to impose a spaced series of a plurality of adjacent transverse heat seals on the advancing web and define a continuous web of a series of joined pairs of envelope pockets; slitting means operative along the longitudinal slot to divide the web longitudinally, and transverse cutting means at the terminal end of the apparatus train, spaced from the heat sealing means by a distance of at least a plurality of envelope sections of the web, and intermittently operative in synchrony with the heat-sealing means and in and between the adjacent transverse heat seals of the trailing edges of the leading pair of envelope sections, to sever said pairs of envelope sections from the said leading ends of the advancing web.

4. Apparatus according to claim 3, in which the heat-sealing means comprises an anvil and a co-

operating heat-sealing bar, at least one of which is reciprocating.

5. Apparatus according to claim 3, in which the heat-sealing means comprises an anvil and a cooperating heat-sealing bar, both of which are mutually reciprocatory.

HARRY F. WATERS.

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