

PATENT SPECIFICATION

1,187,055

DRAWINGS ATTACHED.

Date of Application (No. 17081/67) and filing Complete Specification: 13 April, 1967.

Application made in United States of America (No. 542,512) on 14 April, 1966.

Complete Specification Published: 8 April, 1970.



Index at acceptance:—B5 D1B.

International Classification:—B 31 b 31/00.

COMPLETE SPECIFICATION.

Method and Apparatus for Folding and Sealing Block Bottom Closures in Thermoplastic Bags.

We, UNION CARBIDE CORPORATION, a Corporation organised under the laws of the State of New York, United States of America, of 270 Park Avenue, New York, State of New York, 10017, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a device for forming and sealing closures in thermoplastics bags and a method in connection therewith. More particularly, this invention relates to a method and device for forming and sealing end closures in square-end heavy-walled thermoplastic industrial shipping bags.

Thermoplastic film of proper thickness has adequate impact, tear and tensile strengths for use as a bag forming material in the construction of heavy-duty bags useful for packaging and shipping bulk quantities of the order of 50 to 100 pounds of granular quantities such as fertilizers, molding powders, dyes and pigments and food stuffs such as sugar, beans, or flour. In contradistinction to the older conventional bag forming materials such as woven fabric or multi-ply paper, a thermoplastic film provides superior protection against vermin, the accidental wetting of the package commodity, loss and gain in moisture content and minimum loss of finely divided materials as by sifting through seams or closures.

These advantages of thermoplastic film as a material of construction for heavy-duty bags have been appreciated by the art in the development of heavy-duty square-end bags. Such heavy-duty bags are

fabricated from heavy-gauge thermoplastic film, generally of the order of 5 to 10 mils, which require strong heat seals at the ends. However, present day methods and devices for forming and heat sealing end closures in square-end bags of heavy-walled or gauge film have not consistently provided satisfactory heat seals. Frequently the folds are wrinkled as opposed to smooth and flat. Consequently, even and continuous heat seals are not always possible.

A typical present-way method for forming and sealing end closures in bags of the above type is as follows: the end of such a bag which has been previously cut, shaped and opened is sealed by overlapping the side flaps by means of rollers and the like and holding these flaps in this overlapping relationship while they are heat sealed together. Because they must remain in place while the heat seal is being made, the rollers have to be short enough to clear the sealing platen and located so as not to obstruct the areas to be sealed. These limitations prevent positive securing of the folded flaps in the desired position before the sealing platen is applied. This applies more particularly to the extremities of the flaps which the rollers cannot be made long enough to control because of the required seal pattern. Consequently, poor end folds and seals frequently result from these limitations.

According to the present invention there is provided a device for folding and sealing a block bottomed end closure in a thermoplastic bag, said device comprising: a) means for securing the body of said bag at one end which end has been cut, shaped and opened to form a pair of opposing end flaps and a pair of opposing side flaps, b)

[Price 5s. 0d.]

an internal former, the arrangement being such that one of the opposed end flaps may be infolded over the internal former and the side flaps may be outfolded over means for effecting subsequent infolding, c) means for sequentially infolding said opposing pair of side flaps in overlapping relationship to each other over the end flap and internal former such that said infolding means retain said side flaps in their overlapping relationship during the heat-sealing operation without interfering with the heat sealing operation, and d) means for heat sealing said infolded side flaps to each other.

In a preferred embodiment of the present invention there is provided a device for folding and sealing a block bottomed end closure in a thermoplastic bag, said device comprising: a) a split-platen for securing the body of said bag at least one end of which has been cut, shaped and opened to form a pair of opposing end flaps and a pair of opposing side flaps, b) a heat resistant platen, the arrangement being such that one of the opposed end flaps may be infolded over a heat-resistant platen and the side flaps may be outfolded over folding means; c) a pair of opposed folding curtains which are wound up on spring-loaded rolls such that said curtains can be unwound from and wound about the circumference of said rolls when said rolls are advanced and retracted, to infold the side flaps, each of said curtains being secured to an opposite edge of said split-platen, said spring-loaded rolls being rotatably mounted parallel to the width of said bag and positioned adjacent the outer edge of said outfolded side flaps, one of said curtains being adapted to be held taut across said overlapping side flaps while said side flaps and said end flap are heat sealed therethrough, and c) a heat sealing platen for sealing said infolded side flaps to each other.

The present invention also provides a method for folding and sealing block bottomed end closures in thermoplastic bags which method comprises a) cutting, shaping and opening one end of a thermoplastic bag thereby forming a pair of opposing side flaps and a pair of opposing end flaps; b) positioning the body of said bag in such a way that one of the end flaps is infolded over an internal former and the side flaps are outfolded over means for effecting subsequent infolding; c) sequentially infolding the side flaps in overlapping relationship to each other over the internal former, and d) retaining said side flaps in overlapping relationship by means of said means for effecting subsequent infolding and heat sealing said side flaps to each other and to at least one end flap whilst so retained.

In the Drawing:

Fig. 1 is an end elevational view partly

in section of a device embodying the invention showing an industrial thermoplastic shipping bag and a former in place.

Fig. 2 is a similar view of the device of Fig. 1 showing another stage of operation.

Fig. 3 is a similar view of the device of Fig. 1 showing a further stage of operation.

Fig. 4 is a similar view of the device of Fig. 1 showing a still further stage of operation.

Fig. 5 is a plan view partly in section of the device of Fig. 1 showing the stage of operation of Fig. 1.

Fig. 6 is a similar view of the device of Fig. 5 showing another stage of operation.

Referring now to the drawing, as shown in Figs. 1 and 5, the device of the invention includes a thermoplastic industrial shipping bag 10, one end of which having a pair of opposing end flaps 12, 14 and a pair of opposing side flaps 16, 18; a pair of clamping bars 20, 22, or split-platen and an internal former or heat-resistant platen 24. It is preferred to use an internal former covered with silicone rubber because uniform sealing pressures are achieved and no high spots are experienced. The device further includes a pair of folding curtains 25, 26, one end of each being attached to one of a pair of spring-wound rollers 28, 30, respectively in the manner of a roll-up window shade. Each of the rollers is held by mechanically-actuated arms 11, 13. The other end of each folding curtain is attached to each of the clamping bars 20, 22 at 32, 34 respectively along a line adjacent to one of the parallel edges of the former 24 when it is in position.

As further shown in Figs. 1 and 5 when the device is in operation, the bag 10 is secured between the clamping bars 20, 22 with end flap 12 infolded over former 24 and end flap 14 infolded under the former 24. The opposing side flaps 16, 18 are outfolded across the top surfaces of the clamping bars 20, 22 and the rollers 28, 30. The internal former 24 which is secured to a conventional mounting carriage is allowed to rest on the opposing side flaps parallel to the clamping bars. Note that the device is shown in a horizontal plane. However, the device is also operable in a vertical plane and therefore the top surfaces of the clamping bars 20, 22 become the side surfaces.

To fold a bag flap, as shown in Figs. 2 and 6, the roller 28 is raised above the clamp 20 and former 24 and rolled over the former, against which it is pressed by spring tension. The folding curtain 26 is pulled taut against the edge of the former 24 as it unwinds from its roll 28.

Now looking at Fig. 3, as the first roll 28 completes its stroke across the former 24, folding the first flap 16, the other roll

30 similarly rises above the clamp 22 and rolls across the former 24 in the opposite direction thereby folding the second flap 18 and pushing the first roll 28 back ahead of it. During the backward stroke of the first roll 28, the curtain 26 remains taut as it winds up on its roll 28. Both flaps 16, 18 are now held in place by the second roll 30 and curtain 26 (Fig. 4). Thereupon, a suitable heated sealing platen 15 is lowered and the flaps are heat-sealed through the curtain to each other and to end flap 14. Thus no obstruction exists for the sealing platen, which can be of much simpler design than in present day devices. After sealing, the heated platen 15 is raised, the second folding curtain 30 rolled back to its recess and the internal former 24 is withdrawn.

The device of the invention is simple and of low cost as compared to present day devices for making the folds in thermoplastic bags. Furthermore, the device allows for good utilization of the parallel edges of the former as guides for making the folds and also permits positive securing of the folded flaps in the desired position before the sealing platen is applied, especially at the extremities of the flaps. Thus, excellent end folds and seals are realized. Another advantage of the present invention is that the same set of folding rollers can be used for every size of bag ends, thus, a bag manufacturer is provided with the convenience and the cost saving of having merely one set of folding rollers instead of different sets for different sizes of bag ends. A further advantage of the folding curtain over present day devices is that, after sealing, the peeling off of the second curtain as it rolls back is gentle on the hot film and avoids tearing of the seal which sometimes occurs because of sticking when a conventional heated platen is pulled away from the work.

While a comparable material can be employed, it is preferred to fabricate the folding curtains from glass cloth coated with polytetrafluoroethylene of about 5-mil thickness. This material which is flexible and durable, is most desirable because it is heatproof and prevents the sealing platen from sticking to the thermoplastic film. Note that this requirement does not apply to the first folding curtain, which does not come in contact with the sealing platen and therefore could be made of some other suitable material or fabric. Also, the folding curtains being fabricated as above, eliminates covering the sealing platen in a like manner. Therefore, the sealing platen can be of much simpler design than present day sealing platens.

WHAT WE CLAIM IS:—

1. A device for folding and sealing a block bottomed end closure in a thermo-

plastic bag, said device comprising:

a) means for securing the body of said bag at one end which end has been cut, shaped and opened to form a pair of opposing end flaps and a pair of opposing side flaps;

b) an internal former, the arrangement being such that one of the opposed end flaps may be infolded over the internal former and the side flaps may be outfolded over means for effecting subsequent infolding;

c) means for sequentially infolding said opposing pair of side flaps in overlapping relationship to each other over the end flap and internal former such that said infolding means retain said side flaps in their overlapping relationship during the heat-sealing operation without interfering with the heat-sealing operation, and

d) means for heat-sealing said infolded side flaps to each other.

2. A device as claimed in claim 1 wherein said means for effecting subsequent infolding comprises a pair of opposed folding curtains which are wound up on spring-loaded rolls such that said curtains can be unwound from and wound about the circumference of said rolls when said rolls are advanced and retracted to unfold the side flaps, each of said curtains being secured to an opposite edge of said means for securing the body of said bag, said spring-loaded rolls being rotatably mounted parallel to the width of said bag and positioned adjacent the outer edge of said outfolded side flaps, one of said curtains being adapted to be held taut across said overlapping side flaps while said side flaps and said end flap are heat-sealed therethrough.

3. A device as claimed in claim 1 or 2 wherein said means for securing the body of said thermoplastic bag comprises a split-platen.

4. A device as claimed in claim 1, 2 or 3 wherein said internal former comprises a heat-resistant platen.

5. A device as claimed in any one of the preceding claims wherein said means for heat-sealing said infolded side flaps to each other comprises a heated sealing platen.

6. A device as claimed in claim 2 or any one of claims 3 to 5 when dependant on claim 2 wherein at least one of said folding curtains comprises a heat-resistant sheet.

7. A device as claimed in claim 6 wherein said heat-resistant sheet is a glass cloth coated with polytetrafluoroethylene.

8. A device for folding and sealing a block bottomed end closure in a thermoplastic bag, said device comprising:

a) a split-platen for securing the body of said bag at least one end of which has

30 similarly rises above the clamp 22 and rolls across the former 24 in the opposite direction thereby folding the second flap 18 and pushing the first roll 28 back ahead of it. During the backward stroke of the first roll 28, the curtain 26 remains taut as it winds up on its roll 28. Both flaps 16, 18 are now held in place by the second roll 30 and curtain 26 (Fig. 4). Thereupon, a suitable heated sealing platen 15 is lowered and the flaps are heat-sealed through the curtain to each other and to end flap 14. Thus no obstruction exists for the sealing platen, which can be of much simpler design than in present day devices. After sealing, the heated platen 15 is raised, the second folding curtain 30 rolled back to its recess and the internal former 24 is withdrawn.

The device of the invention is simple and of low cost as compared to present day devices for making the folds in thermoplastic bags. Furthermore, the device allows for good utilization of the parallel edges of the former as guides for making the folds and also permits positive securing of the folded flaps in the desired position before the sealing platen is applied, especially at the extremities of the flaps. Thus, excellent end folds and seals are realized. Another advantage of the present invention is that the same set of folding rollers can be used for every size of bag ends, thus, a bag manufacturer is provided with the convenience and the cost saving of having merely one set of folding rollers instead of different sets for different sizes of bag ends. A further advantage of the folding curtain over present day devices is that, after sealing, the peeling off of the second curtain as it rolls back is gentle on the hot film and avoids tearing of the seal which sometimes occurs because of sticking when a conventional heated platen is pulled away from the work.

While a comparable material can be employed, it is preferred to fabricate the folding curtains from glass cloth coated with polytetrafluoroethylene of about 5-mil thickness. This material which is flexible and durable, is most desirable because it is heatproof and prevents the sealing platen from sticking to the thermoplastic film. Note that this requirement does not apply to the first folding curtain, which does not come in contact with the sealing platen and therefore could be made of some other suitable material or fabric. Also, the folding curtains being fabricated as above, eliminates covering the sealing platen in a like manner. Therefore, the sealing platen can be of much simpler design than present day sealing platens.

WHAT WE CLAIM IS:—

1. A device for folding and sealing a block bottomed end closure in a thermo-

plastic bag, said device comprising:

- a) means for securing the body of said bag at one end which end has been cut, shaped and opened to form a pair of opposing end flaps and a pair of opposing side flaps;
- b) an internal former, the arrangement being such that one of the opposed end flaps may be infolded over the internal former and the side flaps may be outfolded over means for effecting subsequent infolding;
- c) means for sequentially infolding said opposing pair of side flaps in overlapping relationship to each other over the end flap and internal former such that said infolding means retain said side flaps in their overlapping relationship during the heat-sealing operation without interfering with the heat-sealing operation, and
- d) means for heat-sealing said infolded side flaps to each other.

2. A device as claimed in claim 1 wherein said means for effecting subsequent infolding comprises a pair of opposed folding curtains which are wound up on spring-loaded rolls such that said curtains can be unwound from and wound about the circumference of said rolls when said rolls are advanced and retracted to unfold the side flaps, each of said curtains being secured to an opposite edge of said means for securing the body of said bag, said spring-loaded rolls being rotatably mounted parallel to the width of said bag and positioned adjacent the outer edge of said outfolded side flaps, one of said curtains being adapted to be held taut across said overlapping side flaps while said side flaps and said end flap are heat-sealed therethrough.

3. A device as claimed in claim 1 or 2 wherein said means for securing the body of said thermoplastic bag comprises a split-platen.

4. A device as claimed in claim 1, 2 or 3 wherein said internal former comprises a heat-resistant platen.

5. A device as claimed in any one of the preceding claims wherein said means for heat-sealing said infolded side flaps to each other comprises a heated sealing platen.

6. A device as claimed in claim 2 or any one of claims 3 to 5 when dependant on claim 2 wherein at least one of said folding curtains comprises a heat-resistant sheet.

7. A device as claimed in claim 6 wherein said heat-resistant sheet is a glass cloth coated with polytetrafluoroethylene.

8. A device for folding and sealing a block bottomed end closure in a thermoplastic bag, said device comprising:

- a) a split-platen for securing the body of said bag at least one end of which has



been cut, shaped and opened to form a pair of opposing end flaps and a pair of opposing side flaps;

- 5 b) a heat-resistant platen, the arrangement being such that at least one of the opposed end flaps may be infolded over a heat-resistant platen and the side flaps may be outfolded over folding means;
 - 10 c) a pair of opposed folding curtains which are wound up on spring-loaded rolls such that said curtains can be unwound from and wound about the circumference of said rolls when said rolls are advanced and retracted, to infold the side flaps, each of said curtains being secured to an opposite edge of said split-platen, said spring-loaded rolls being rotatably mounted parallel to the width of said bag and positioned adjacent the outer edge of said outfolded side flaps, one of said curtains being adapted to be held taut across said overlapping side flaps while said side flaps and said end flap are heat sealed therethrough, and
 - 25 d) a heat sealing platen for sealing said infolded side flaps to each other.
9. A device as claimed in claim 8 wherein at least one of said folding curtains comprises a heat-resistant sheet.
10. A device as claimed in claim 9 wherein said heat-resistant sheet is a glass cloth coated with polytetrafluoroethylene.
- 35 11. Method for folding and sealing block bottom end closures in thermoplastic bags which method comprises:
- 40 a) cutting, shaping and opening one end of a thermoplastic bag thereby forming a pair of opposing side flaps and a pair of opposing end flaps;
 - 45 b) positioning the body of said bag in such a way that one of the end flaps is infolded over an internal former and the side flaps are outfolded over means for effecting subsequent infolding;
 - c) sequentially infolding the side flaps in overlapping relationship to each other over the internal former, and
 - 50 d) retaining said side flaps in overlapping relationship by means of said infolding means and heat sealing said side flaps to each other and to at least one end flap whilst so retained.
- 55 12. A method as claimed in claim 11

wherein said internal former comprises a heat-resistant platen.

13. A method as claimed in claim 11 or 12 wherein said folding means comprises a pair of opposed folding curtains which are wound up on spring-loaded rolls such that said curtains can be unwound from and wound about the circumference of said rolls when said rolls are advanced and retracted to unfold the side flaps each of said curtains being secured to an opposite edge of said means for securing the body of said bag, said spring-loaded rolls being rotatably mounted parallel to the width of said bag and positioned adjacent the outer edge of said outfolded side flaps, one of said curtains being adapted to be held taut across said overlapping side flaps while said side flaps and said end flap are heat sealed therethrough.

14. A method as claimed in claim 13 wherein said folding curtains are adapted to be peeled off of said heat sealed flaps upon retraction of said rolls such that tearing of the hot seal of said heat sealed flaps is avoided.

15. A method as claimed in claim 13 or claim 14 wherein at least one of said folding curtains comprises a heat-resistant sheet.

16. A method as claimed in claim 15 wherein said heat-resistant sheet is a glass cloth coated with polytetrafluoroethylene.

17. A method for folding and sealing a block bottom end closure in a thermoplastic bag as claimed in claim 11 substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

18. A thermoplastic bag having an end closure folded and sealed by a method as claimed in any one of claims 11 to 17.

19. A device for folding and sealing a block bottom end closure in a thermoplastic bag as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated by the accompanying drawings.

BOULT, WADE & TENNANT,
111 & 112, Hatton Garden,
London, E.C.1,
Chartered Patent Agents,
Agents for the Applicants.

