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Lemelson

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[54] **HEAT SEALING MACHINE AND METHOD**

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[52] **U.S. Cl.** **53/241,** 53/256

[51] **Int. Cl.** **B65b 5/04**

[58] **Field of Search** 53/241, 256, 182, 138

[56] **References Cited**

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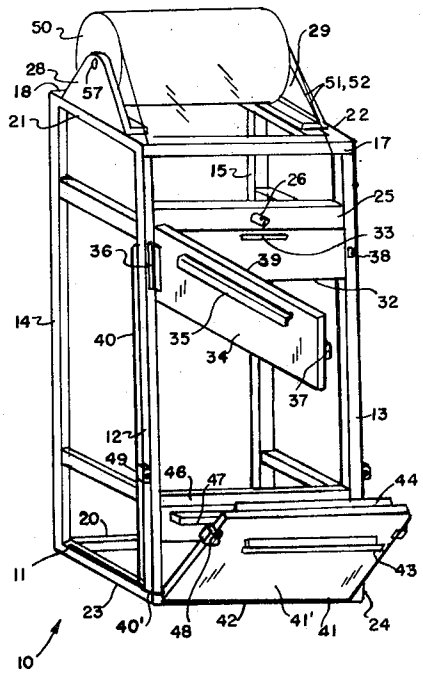
Primary Examiner—Andrew R. Juhasz

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[57] **ABSTRACT**

An apparatus and method are provided for forming containers of flexible plastic film and hermetically sealing articles of clothing and the like therein. In one form, a hanger containing an article of clothing is disposed within a partially formed envelope fed from a roll containing a plurality of tandemly arrayed envelope formations and a further sealing operation is effected to seal both the bottom of the envelope and the upper portion thereof against a hanger which protrudes through an opening therein. The envelope may be formed from a flat tube of flexible thermoplastic material or from two sheets of plastic film which are side sealed and end sealed together after the hanger and article of clothing are disposed therein.

10 Claims, 8 Drawing Figures



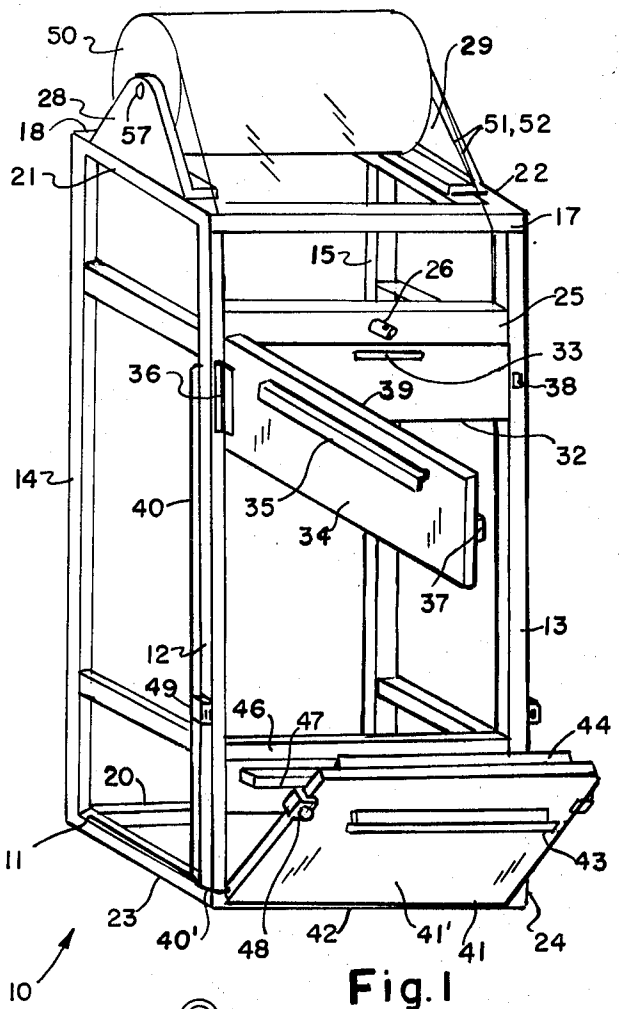


Fig. 1

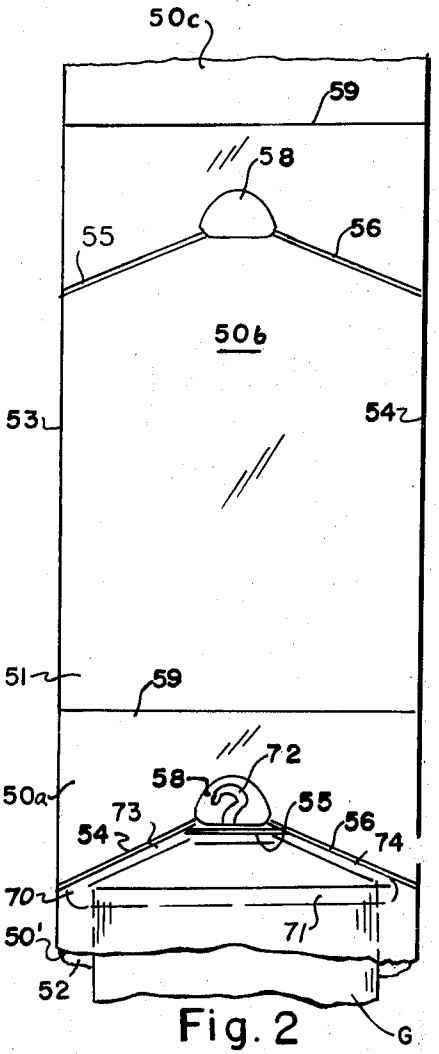


Fig. 2

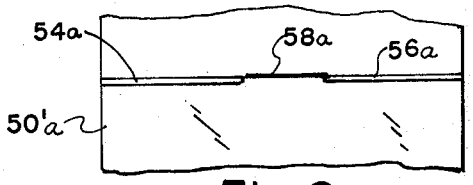


Fig. 2a

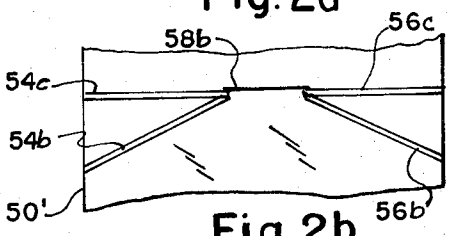


Fig. 2b

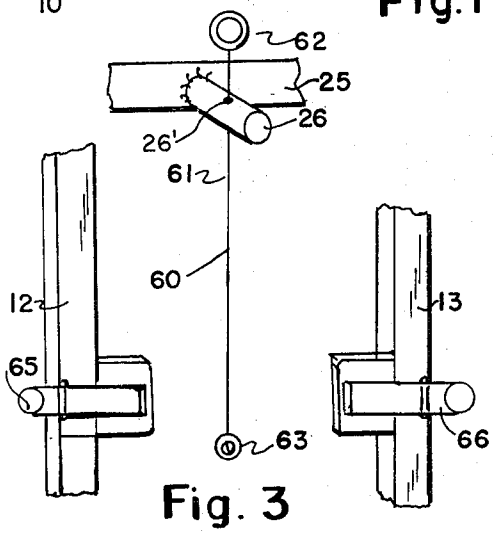


Fig. 3

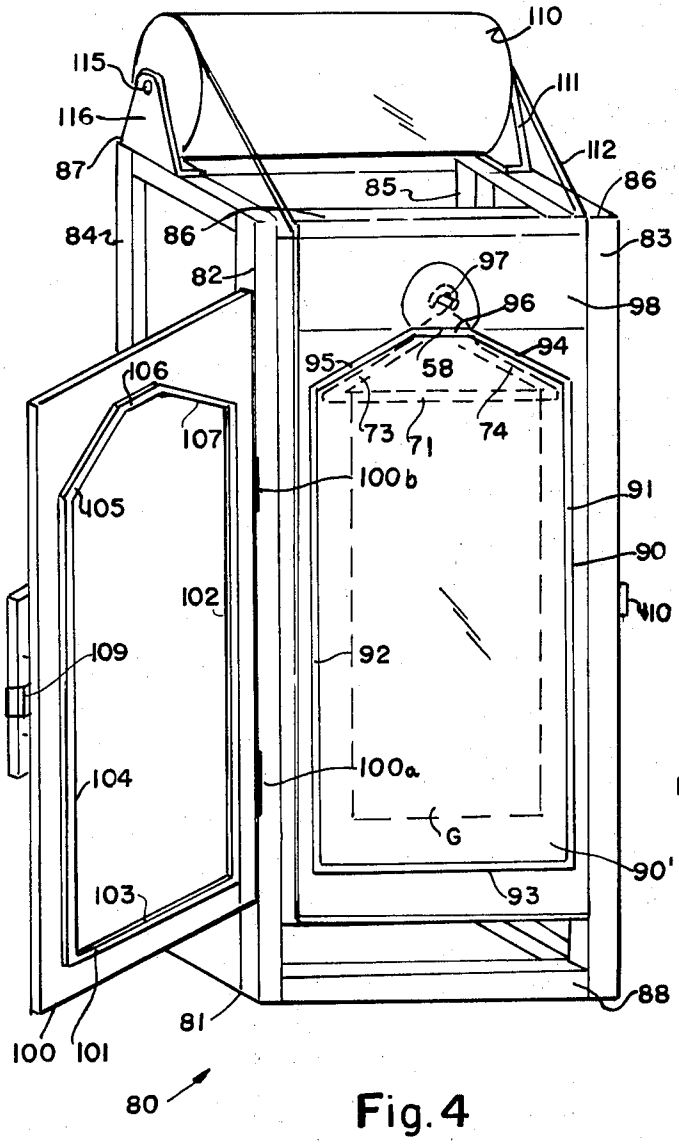


Fig. 4

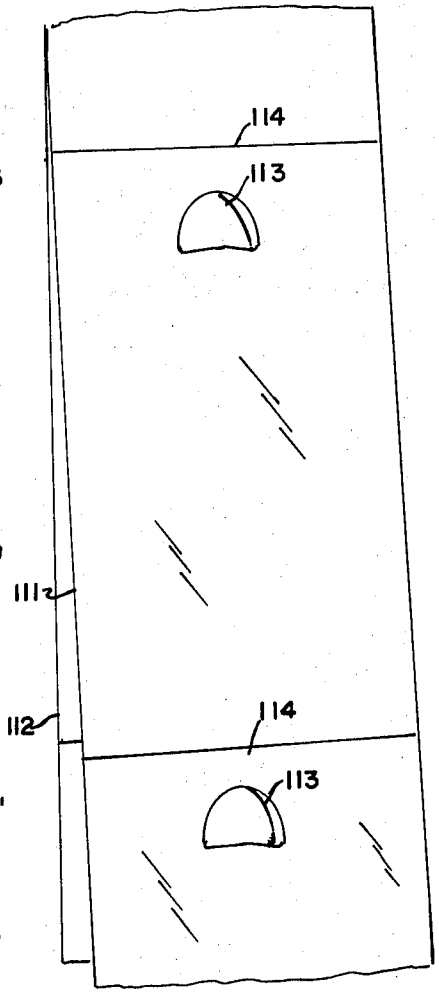


Fig. 5

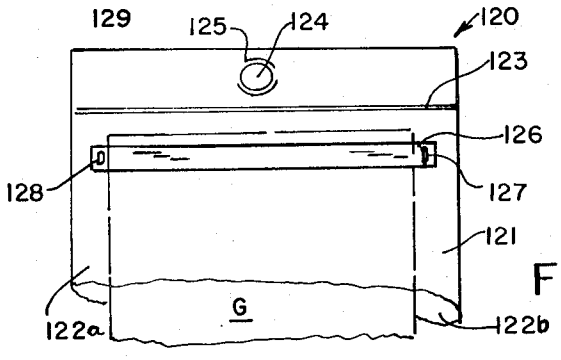


Fig. 6

HEAT SEALING MACHINE AND METHOD

SUMMARY OF THE INVENTION

This invention relates to an apparatus and method for forming flexible walled containers for clothing, drapes and other textile materials which are generally supported by a clothes hanger. In particular, the invention is concerned with an apparatus and method for sealing a clothes hanger containing a garment within a flexible plastic bag while permitting the hook of the clothes hanger to be used in suspending the bag and its contents from above.

It is known in the art to place clothing such as jackets and pants on clothes hangers and to dispose same within a plastic film bag which contains openings in both the top and bottom thereof. Most clothing dry cleaning is packaged as such and the plastic packaging provides little if any protection for the clothing from insects such as moths which have access to the clothing in the bag from either the top end or bottom end of the plastic bag. The instant invention is concerned primarily with providing a new and improved structure in a container assembly and an apparatus and method for rapidly and easily forming same about a clothes hanger containing one or more articles of clothing disposed thereon as illustrated and described, for example, in my copending application Ser. No. 223,279 filed evendate.

Accordingly it is a primary object of this invention to provide a new and improved apparatus and method for forming flexible plastic bag containers for clothing and the like and sealing one or more articles of clothing therein disposed on a clothes hanger which may be used to hang the container and its contents from above.

Another object is to provide an apparatus for forming and sealing large plastic envelopes or bags about clothing disposed on a hanger, a portion of which extends from the upper end of the bag and is sealed to both front and rear walls of the bag.

Another object is to provide a simple apparatus for receiving and retaining a clothes hanger containing one or more articles of clothing thereon, in an upright condition and thereafter easily disposing a plastic envelope about the hanger and its article and sealing same thereabout in a manner permitting use of the hook of the clothes hanger.

Another object is to provide an apparatus which may be easily operated by a cleaning establishment to provide its customers with dry cleaned clothing in a sealed bag which may be easily supported from above.

With the above and such other objects in view as will hereinafter more fully appear, the invention consists of the novel constructions, combinations and arrangements of parts as set forth in the following specification and accompanying drawings but it is to be understood that changes and variations therein may be resorted to which come within the purview of the invention as claimed.

In the drawings:

FIG. 1 is an isometric view of one form of an apparatus operable for sealing an article of apparel or other form of textile material draped on a clothes hanger or the like within a flexible bag which is formed of flat tubular plastic film or laminate including heat sealable material;

FIG. 2 is a plan view of a tandem array of flexible plastic bags coming from a roll supply thereof as provided in FIG. 1;

FIG. 2*a* is a front view of a portion of another form of tandem array of plastic bags applicable to be used with sn apparatus of the type shown in FIG. 1;

FIG. 2*b* is a front view of a portion of another form of tandem array of plastic bags applicable for use in an apparatus which is a modification of that shown in FIG. 1;

FIG. 3 is an isometric view showing further details of an apparatus of the type shown in FIG. 1;

FIG. 4 is an isometric view of a modified form of apparatus of the type shown in FIG. 1 which is operable to form plastic bag containers of the same type provided by the apparatus of FIG. 1 from two separate sheets of plastic film;

FIG. 5 is an isometric view of two sheets of prefabricated plastic film for use in the apparatus of FIG. 4; and

FIG. 6 is a front view of a portion of a modified form of plastic bag container and contents producible by means of an apparatus of the types shown in FIGS. 1 and 4.

There is shown in FIG. 1 one form of the invention comprising an apparatus **10** for forming bag containers for holding and sealing clothing such as pants, suits, jackets, dresses, skirts and coats and the like. The apparatus **10** comprises a rigid frame **11** composed of vertical steel box beams **12, 13, 14** and **15** joined by upper and lower front and rear beams **17, 18, 19** and **20** and upper and lower side beams **21, 22, 23** and **24.** Rotatably supported at the top of the frame **11** is a roll supply **50** of two side seam welded sheets **51** and **52** of clear plastic film, defining the front and rear walls of the plastic bags to be formed thereof and prefabricated as shown in FIG. **2** with a series of spaced-apart die cut outs **53** and seal lines **54, 55** and **56** which will be described. The hub **57** of the plastic film roll **50** is a tube supported for rotation at its ends by bearing brackets **28** and **29** which support a shaft **30** extending through the hub **57** permitting the plastic sheets to be unreeled from the roll **50** by hand pulling same.

Supported near the upper end of the front of frame **11** by frame verticals **12** and **13** is a cross bar **25** which supports a pin **26** and a mount **32** for a welding die component **33.** A welding die support **34** is pivotally supported by a hinge **36** by the frame vertical **12** permitting it to swing towards the frame and engage a welding die **35** supported thereby against the sheets **51** and **52** to cooperate with the die component **33** in welding said sheets therebetween.

Another support **46** for a stationary welding die component **47** is supported across verticals **12** and **13** lower down the frame **11.** A further with **41** in the form of a pivoted plate **41'** mounts a bar welding die **44** operable to cooperate wih die **47** in effecting a line seal across the bottom of the bag below the lower end of the garment G. Plate **41'** may be merely hand pushed towards bar **47** for impulse sealing of the plastic sheets or may be held by latch components **48** and **49,** respectively secured thereto and frame **11,** during the sealing operation.

Notations **35** and **43** refer to handles for manually opening and closing the die supports **34** and **41.** Notations **37, 38** and **48, 49** refer to latching components secured to the supports **34** and **41** and the members of the frame which they engage for retaining said supports

closed against the frame to permit welding to be effected. Notations **40** and **40'** refer to electrical wires extending along frame **11** to electrical heating elements or electronic welding dies forming the welding dies **39** and **44** for conducting electrical energy thereto when a switch **60** supported on a bracket **61** at the side of frame vertical **13** is closed.

The packaging material fed from **50** is fabricated as shown in FIG. **2** and is composed of front and rear wall portions **51** and **52** which are joined by welding or asformed along their longitudinal borders **53** and **54** to form a flat tube **50'** thereof which, after each operation, is open at the bottom when the endmost envelope is removed therefrom.

The tube **50'** is composed of separate tandem envelopes denoted **50***a*, **50***b*, **50***c*, etc. each of which is defined by a tear line **59** of weakness in both front and rear walls **51** and **52**, respective weld lines **56** and **54** defining the upper end of each envelope and each extending inwardly towards the other from a respective longitudinal border of the envelope. The weld lines **56** and **54** terminate a distance apart at a cut out **58** formed by die-cutting material from the center portions of both walls thereby providing an opening along the upper border of each envelope through which opening the neck of a special clothes hanger may be passed to project the hook thereof from the assembled container for hanging the container and the contents from above.

In effecting a packaging operation, a garment is first disposed or draped across the cross-bar portion **71** of a flat plastic clothes hanger **70** as shown in FIG. **2.** The pin **26** contains a vertical hole **26'** therethrough near its end, through which hole a flexible line **61** may be pulled. The upper end of line **61** contains a first ring **62** and the lower end thereof is secured to a second ring **63** which is dropped through the opening **58** in the upper border of the lower envelope **50***a* to be used in packaging the garment. The ring **63** is of sufficient weight to drop line **61** downwardly through the envelope to the bottom end thereof whereupon the hook **72** of the hanger **70** may be passed through said lower ring. Pulling on the upper ring **62** carries the hanger **70** and garment upwardly through the envelope **50***a* while said envelope is held down with one hand or the borders thereof are retained by clamps **65** and **66** against frame members **12** and **13.** When the hanger hook reaches the opening **55** beneath pin **26,** it is grasped and disposed by hand over the pin **26** while the line **62** is dangled behind the pin. Thereafter, supports **34** and **41** are pivoted and latched against the upper and lower portions of the envelope to seal the material of both walls **51** and **52** adjacent opening **58** against each other and the hanger **70** and to effect a seal completely across the bottom of the envelope as shown in FIG. **4** and further disclosed in my copending application Ser. No. 223,279, filed evendate.

Once the movable die assemblies are secured against the frame **11** compressing the plastic film against the neck of the clothes hanger at the top and against itself at the bottom of the envelope, the operator may close a switch (not shown) energizing or heating the die elements to effect sealing of the plastic film to itself and to the hanger as described. Power operated means such as an electric motor,solenoid or air cylinder may also be used for closing the movable die in effecting a sealing operation and opening it thereafter.

The welding machine **10** shown in FIG. **1,** when provided with a prefabricated tubular formation **50'** such as that illustrated in FIG. **2,** need merely be operated to effect a seal line such as **55** across the upper, central portion of each envelope adjacent the opening **58** therein and a second seal line across the lower end of the envelope along or just above the tear line **59** to totally enclose and hermetically seal the hanger and its garment therein. If it is desired to provide the apparatus **10** so that it may be used to seal plastic bags of different length depending on the length of the garment or the distance it is suspended below the hanger, the lower sealing bars **44** and **47** may be vertically adjustable on their respective mounts to permit selected lowering or raising of either or both sealing dies to vary the distance which the lower sealing line may be effected from the upper end of the envelope.

The seal lines **54** and **56** which are formed at spaced intervals in the tubular formation **50'** of FIG. **2,** preferably comprise so-called tear-seals from which the plastic material disposed above the sealed bag may be easily removed by a pulling action although said material may be retained and permitted to droop downwardly behind the sealed bag or envelope. FIGS. **2***a* and **2***b* show modified forms of the tandem array of prefabricated envelope forming portions of the plastic film material fed from roll **50.** In FIG. **2***a* tear seals **54***a* and **56***a* extend from respective lateral borders of the tubular formation which is denoted **50'***a* and terminate at a slotted opening **58***a* along the central portion of the flat tube. In utilizing the tubular material of FIG. **2***a*, the operator of the welding apparatus first pulls the endmost tubular formation downwardly from the roll **50** until the slotted opening **58***a* thereof is in alignment with pin **26** which is pushed through said slotted opening. The ring **62** is then pulled to draw the flexible string **60** upwardly so that the lower ring **63** may be dropped through the slotted opening **58***a* and fall downwardly through the endmost tube. This action may be accomplished while the lower end of the endmost tube is held by clips such as **65** and **66** against the frame vertical beams **12** and **13.** When the ring **63** falls completely through the endmost tubular formation, the hook of a garment containing hanger may be disposed on the ring after which the upper ring **62** may be pulled to carry the hanger and garment upwardly through the tube. The hanger hook may then be placed on pin **26** after which the endmost tubular formation is sealed along its bottom end and along the opening **56***a* as described or after the endmost tubular formation has been severed from the next formation by manually tearing along tear seal lines **54***a* and **56***a*. The unsupported portions of flexible envelope between the seal lines **54***a* and **56***a* and the downwardly extending side legs of the hanger may be allowed to droop backwardly or to the front of the hanger and its garment or may be removed if downwardly extending tear seal lines similar to **54** and **56** of FIG. **2** are provided by means of suitable sealing dies supported by supports **34** and **32.**

In another embodiment shown in FIG. **2***b* each of the envelope forming portions of the tubular formation may contain two sets of tear sealing lines for removing the excess material extending beyond the legs of the hanger. In FIG. **2***b*, a first aligned set of laterally extending tear seal lines **54***c* and **56***c* extend to the central slotted opening **58***b* while a second set of downwardly and outwardly extending tear seal lines **54***b* and **56***b*

extend parallel to the side legs of the hanger as illustrated. Thus the operator of the apparatus of FIG. 1 may not only remove the endmost envelope forming open bag or the totally sealed bag from the rest of the material by tearing the tear seal lines 54*c* and 56*c* to the slotted opening 58*b* but he may also remove the unsupported portions of material above seal lines 54*b* and 56*b* by tearing therealong.

In FIG. 4 is shown another form of the invention in which an entire envelope is fabricated of separate sheets 111 and 112 of plastic film fed from a roll 110 above the welding machine and each disposed on opposite sides of a hanger which is supported at the front of the machine frame and contains an article or articles of apparel. The apparatus 80 comprises a box-like frame support 81 of steel channeling or tubing composed of front verticals 82, 83, rear verticals 84, 85, front horizontals 86 and 88, rear horizontals 87 and 89 (not shown) and side horizontal frame members joining the front and rear verticals.

A frame 90 of stationary welding die elements 91–96 is supported by the front frame to cooperate with a welding die 101 which is insulatedly supported by a movable plate 100 which is pivoted on hinges 100*a* and 100*b* secured to the leg 82 of the frame 81. Welding frame 90 is composed of vertical welding bars 91 and 92 supported by a base plate 90′ and operable to cooperate in welding the longitudinal edge seams of the bag or envelope. A horizontal welding bar 93 extends between bars 91 and 92 at the lower ends thereof for welding the lower end of the envelope closed.

Inclined bars 94 and 95 are adapted to weld portions of the walls of the envelope which extend parallel to and just above the upper lateral legs 73 and 74 of the clothes hanger disposed within the envelope when the hook of said hanger is hung from a pin 97 supported by a plate 98 secured to the top of frame 81 extending between frame verticals 82 and 83. Another portion 96 of the stationary welding frame cooperates in effecting welding of the walls of the bag across the neck of the hanger between the tear seal lines formed by bars 94 and 95. Notation G refers to an article of clothing draped over the horizontal cross bar 71 of the hanger 70 sealed within the bag formed by welding of the sheets 111 and 112 by means of the apparatus 80.

The described welding bars 91–96 may comprise electrodes of an electronic radio-frequency plastic sheet welding system which cooperate with movable electrodes or they may be replaced by a single platen secured across the front of frame 81. In FIG. 4 a swinging plate 100 supports a welding bar die assembly 101 composed of bar elements 102–107 which conform to the stationary electrodes 91–96 of die 90. The plate 100 insulatedly supports the welding die 101 and is pivotally supported by hinges 108 and 108′ which are secured thereto and frame vertical 82. A latch element 109 secured to plate 100 cooperates with a latch element 110 secured to vertical 83 in retaining plate 100 with its die 90 compressing the border portions of the two sheets 111 and 112 together for welding same into an envelope as described. A cable or wire 108 contains one or more conductors of suitable electricity for the welding die 101 while the die 91 or plate cooperating therewith may be grounded or otherwise connected to the electrical circuit supplying welding energy to the apparatus.

Both sheets 111 and 112 fed from roll 110 are die cut with aligned openings 113 therein which accommodate the ring or hook of the hanger permitting it to be disposed on the pin 97 in front of sheet 111 and underneath sheet 112. Notation 114 refers to lines of weakness in both sheets 111 and 112, each of which lines extend completely across the sheets a distance below each cut-out 113 to permit each welded bag to be easily severed from the sheet material extending thereto from the roll supply thereof. The seal lines above and below each envelope provided by sealing die portions 103, 105 and 107 may be tear seals permitting the excess sheet material to be easily removed from the sealed bag. Notation 115 refers to a rod extending through the center wall of roll 110 which is supported in bearing by brackets 116 and 117 welded to the top of the frame.

In operation of the machine 80, the endmost length of the plastic sheets 111 and 112 is pulled from the roll 110 until the next opening 113 is aligned with pin 97 centered therein. The outer sheet 112 is then lifted and the hook of the hanger containing an article of clothing is placed on the pin 97 whereby the hanger and apparel hang downwardly from the pin aligned with the central portion of the rear sheet 111. Thereafter the outer sheet 112 is dropped down and the movable frame or door 110 is swung inward to engage its die against the border portions of the wall of the envelope to be formed which portions surround the apparel and hanger. The latch 109 is engaged with latch 110 locking the frame in place. Thereafter, electrical energy is applied to the welding dies by operating a foot switch (not shown) to effect line welding of the sheets together around the article and hanger to form a closed envelope. The latch is then released, the frame pivotally opened and the envelope torn along tear seal lines formed by die elements 105 and 107 from the rest of the sheet material.

Modifications to the hereinbefore described heat sealing machinery may be effected with departing from the spirit and nature of the invention. For example, powered means may be provided for closing and opening the described die frame mounts to force the dies together and automatically apply radiation to to dies for effect heat sealing. Air or electric motor operated cylinder or motors may be mounted and operative to both swing close and open the die mounts in an automatically controlled welding cycle which includes the application of electrical energy to the dies or heating elements therefore. The pivoted heat sealing die mounts may be replaced by track or pin mounted means for guiding the dies towards and away from the stationary dies and the bag material therebetween permitting the sealed envelope and contents to be removed by lifting same upwardly from between the open dies after tearing the plastic film from the overhead supply roll fed strip of plastic material defined by sheets 111 and 112.

Heat sealing may also be effected without the necessity of locking or latching the pivoted die supports 34 and 41 of FIG. 1 or dorr 100 of FIG. 4 if impulse sealing electrical energy is employed which is applied to energize the sealing dies by a limit switch which becomes activated upon full closure of the respective pivoted support against the plastic bag and clothes hanger disposed on the front side of the frame or support. Such limit switches may have their actuators defined by notations 38 and 49 of FIG. 1 and 110 of FIG. 4, e.g., at locations such that they will be depressed upon closure

of the movable die supports against the frame or supports **11** and **82** so as to effect the impulse or dielectric sealing of the opposite walls of the envelope together or against the plastic hanger as described.

In FIG. **6** is shown a modified form of plastic bag assembly for holding an article of apparrel or other textile material suspended within an envelope or closed bag. The envelope assembly **120** may be produced by means of an apparatus of the types shown in FIGS. **1** and **4** wherein the dies thereof may be modified to accomplish the desired sealing operation described hereafter. The assembly **120** is composed of a substantially flat plastic tube **121** having a front wall **122***a* joined at its longitudinal borders to a rear wall **122***b*. Welded at its ends to the rear wall **122***b* of the tube **121** is a rigid strip **126** of plastic defining a lateral support for a textile article such as a garment G folded thereover and hanging downwardly therefrom as shown. Notations **127** and **128** refer to spot or short line welds between the thermoplastic strip **126** at the rear wall **122***b* of the plastic tube **121** at the ends of the strip. A seal line **123** extends across the top of the flat tube **121** and above such seal line is provided a circular hole **124** through the front and rear walls of the envelope. Notation **125** refers to a plastic reinforcement or grommet extending through the hole **124** and welded or flange compressed against the material of the tube to reinforce the hole area of the container to permit it to be hung from above on a hook or pin. If the plastic tube **121** is fabricated of polyethylene plastic strip **126** may comprise a flat or U-shaped extrusion of linear, rigid polyethylene.

In a preferred form of the embodiment shown in FIG. **6** the tube or bag **121** is produced of two sheets of plastic or other suitable sheet material, one of which contains strips **126** welded or otherwise secured at their ends to the inside surface thereof facing the other sheet at spaced apart lengths of said two sheets. Then when the sheets are fed from a roll supply thereof, the front sheet may be moved out of the way while an article of clothing is disposed on or over the lowermost strip **126** after which the front sheet is brought against the rear sheet and over the clothing suspended from the strip and is welded along its longitudinal borders and upper and lower ends to define a closed envelope which may be severed from the supply of sheet material along the illustrated upper border **129** which may be tear sealed by suitable die means associated with the heat sealing machine or cut by a shearing knife associated with the sealing equipment.

I claim:

1. An apparatus for sealing an article draped on a clothes hanger within a container comprising in combination:

a support,

means supported by said support for holding the hook portion of a clothes hanger with the hanger suspended downwardly therefrom,

means for supporting two layers of envelope producing plastic sheeting for defining the front and rear walls of an envelope over and around said hanger and an article of clothing held thereby with said sheeting depending sufficiently downwardly from said hanger to extend beyond the end of said article of apparel supported on the hanger,

first die sealing means supported by said support, behind a hanger when said hanger is suspended on said hook holding means,

second die sealing means supported by said support and operable to engage portions of said layers of envelope producing sheeting and to cooperate with said first sealing means in sealing portions of said layers together to form a closed envelope thereof about said hanger and said article of clothing suspended from said hanger,

means for guiding said second sealing means towards said first sealing means to effect the sealing of said sheeting about said hanger and the article supported thereby and to form a closed envelope thereof.

2. An apparatus in accordance with claim **1** wherein said first and second sealing means are shaped and operable to seal the walls of the envelope up to the neck of the hook portion thereof.

3. An apparatus in accordance with claim **2** wherein said first sealing means is shaped and operable to also effect a seal between the front and rear walls of the envelope and a portion of a hanger extending therebetween.

4. An apparatus in accordance with claim **3** wherein said first sealing means is operable to effect a sealing closure completely across the upper end of the envelope.

5. An apparatus in accordance with claim **1** wherein said first and second sealing means includes a sealing bar operable to effect a line seal laterally across the bottom of said two layers of plastic sheeting to close the bottom of said envelope.

6. An apparatus in accordance with claim **5** wherein said sealing bar is adjustable in location to permit the position of said line seal to be varied so as to vary the length of the envelope formed thereby.

7. An apparatus in accordance with claim **1,** wherein said first sealing means is fixed with respect to said support and said second sealing means is movable on said support towards and away from said first sealing means so as to permit it to engage said plastic sheeting against said first sealing means in the act of sealing same and to release same to permit removal of said envelope and its contents from said support.

8. An apparatus in accordance with claim **7** wherein said second sealing means is pivotally mounted on said support and swingable towards and away from said first sealing means.

9. An apparatus in accordance with claim **7** including means for guiding said second sealing means lineally towards and away from said support to engage said first sealing means.

10. An apparaus in accordance with claim **9** including power operating means for moving said second sealing means towards and away from said first sealing means.

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