Oct. 18, 1966 R. WATTS, JR., ETAL 3,279,150

APPARATUS FOR SEALING PACKAGES

Filed Oct. 16, 1963 3 Sheets-Sheet 1

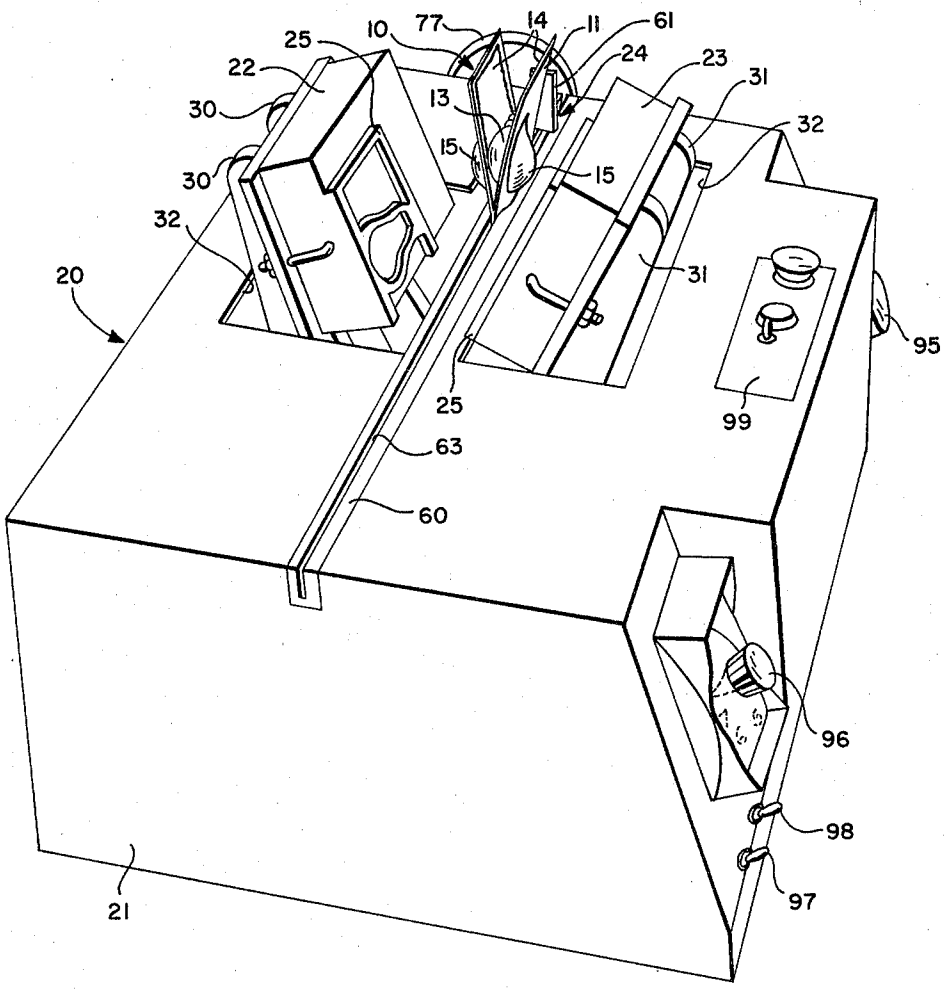


FIG.-1

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Filed Oct. 16, 1963 3 Sheets-Sheet 2

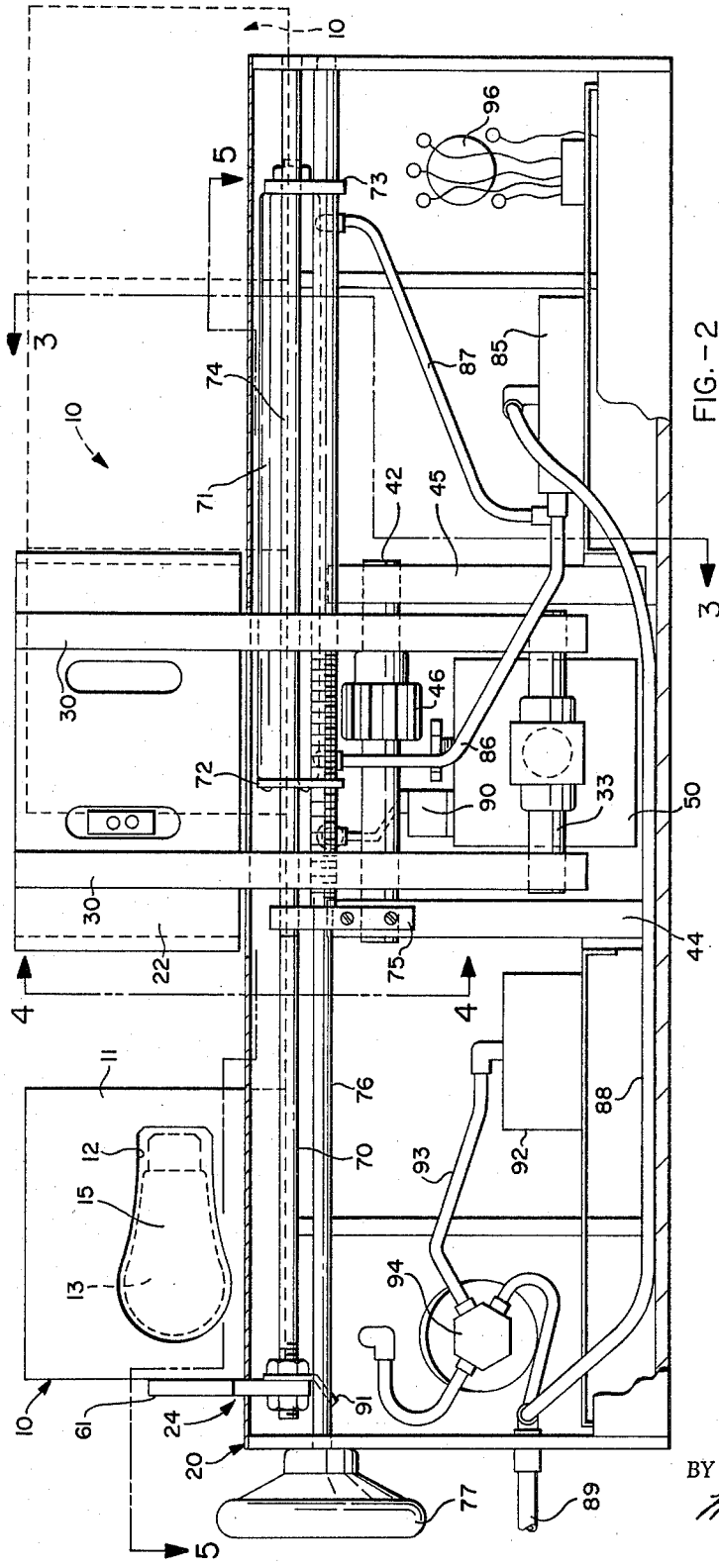


FIG. - 2

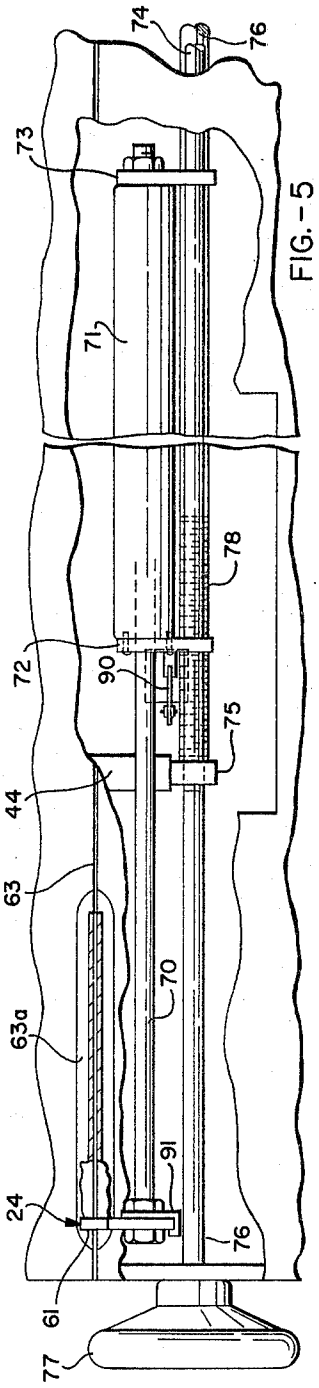


FIG. - 5

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APPARATUS FOR SEALING PACKAGES

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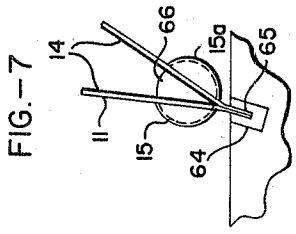


FIG.-7

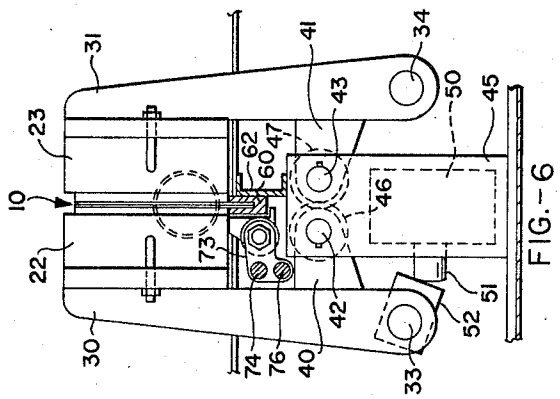


FIG.-6

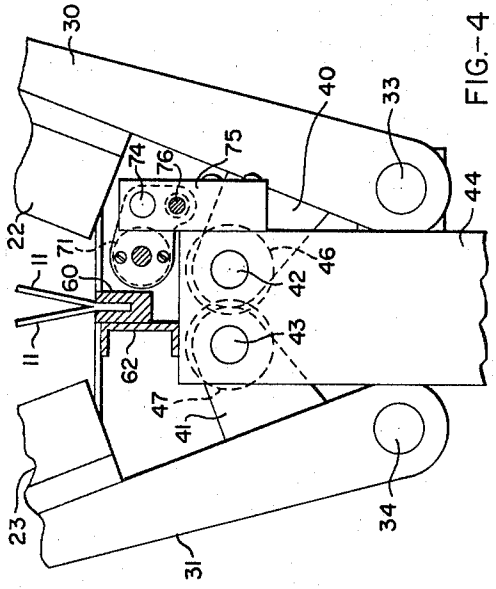


FIG.-4

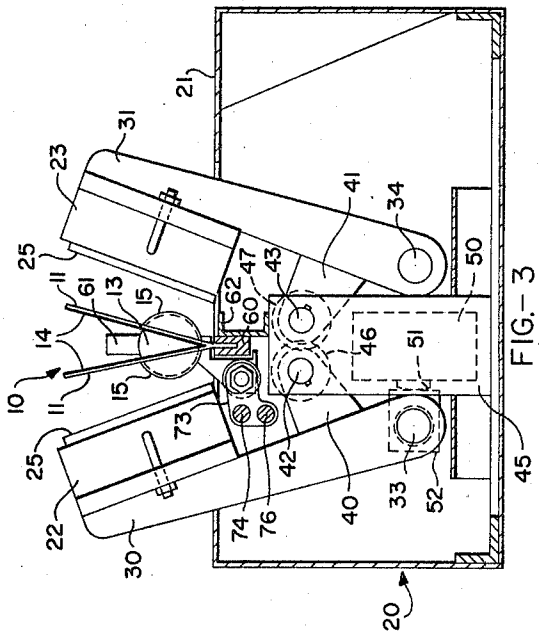


FIG.-3

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United States Patent Office 3,279,150 Patented Oct. 18, 1966

3,279,150

APPARATUS FOR SEALING PACKAGES

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Filed Oct. 16, 1963, Ser. No. 316,765
16 Claims. (Cl. 53—373)

This invention relates generally to article packaging, and more specifically to methods and apparatus for closing heat-sealable display packages.

The invention is particularly concerned with methods and apparatus for sealing unit display packages of the type disclosed in U.S. Patent No. 3,053,023. The package disclosed in that patent combines the advantages of skin, blister, and shrink packaging and consists of a foldover display card having mating product-receiving apertures in each half of the card. The product is positioned within the apertures of the double faced card so that it is snugly gripped and is covered completely by a protective pocket of plastic film, such as polyethylene. With this arrangement the product may selectively project and be visible from either one or both faces of the finished package.

In forming the display packages described above, the polyethylene film is preferably adhered to the back of the card over the product-receiving apertures. Portions of the film are softened and brought through the card apertures to form pockets having the contour of the product to be packaged. After the pockets have been formed in this manner, the card is folded so that the mating pockets of each card half cooperate to define a product contoured chamber and then the product is inserted in the chamber and the card halves secured together to complete the package.

Among the important advantages of the above-described display package is its simplicity and the economies which result from the product manufacturer being able to package his own merchandise without first making a substantial investment in packaging equipment. The present invention enhances those manufacturing economies by providing relatively inexpensive equipment and improved techniques which facilitate the insertion of the product into the package and the subsequent sealing of the card halves. In addition, the invention makes it possible to complete the package with minimum handling of either the folded card or the product and in a length of time which is considerably less than with prior are equipment and techniques.

The invention contemplates sealing the display packages by applying heat and pressure to the outer faces of both card halves and maintaining the heat and pressure for a length of time sufficient to soften the plastic film and thereby seal the card halves together. According to the preferred embodiment of the apparatus hereinafter described in detail, the heat and pressure are applied by a pair of heated platens which are pivotally mounted on horizontal axes. The heated platens are movable toward and away from the folded card which is independently supported therebetween in a generally upstanding position.

As distinguished from this invention, most prior equipment and techniques embody platens which are operated in horizontal positions. Since it is necessary accurately to position or register the package on the lower platen, it is usually not possible to heat the lower platen and heat is supplied exclusively by the upper platen which comes down on the positioned package. With conventional equipment of this type, a typical sealing time for packages as described above is from three to four seconds. The present invention reduces the sealing time for the same package to less than one second.

The invention further contemplates automatically feeding the cards and products as assembled units to the sealing station so that handling of the packages and products is minimized. This advantage is obtained by a preferred construction having a feeding mechanism which includes a support track and a reciprocal member for moving the cards along the track from a loading station to the sealing station. The support track is constructed to receive the folded edges of the cards and to support them in a generally upstanding position with the products to be packaged held in the product-receiving pockets. The products are placed in the pockets at the loading station and then the cards are moved along the track to the sealing station by the reciprocal member. The support track advantageously holds the cards at the sealing station so that the platens can move toward and away from their outer faces.

The preferred feeding mechanism is also self-ejecting. Thus, the sealed packages are automatically moved from the sealing station and are ejected from the apparatus into a suitable hopper or the like. This self-ejecting feature adds to the versatility and the rapid, economical operation characterizing the invention.

Although the invention has been generally described above and more specifically described below as being particularly useful for sealing packages of the type described in U.S. Patent No. 3,053,023, many of the same advantages may be obtained when sealing other forms of display packages. For example, similar reduction in sealing time may be expected when closing foldover-type blister card packages. In addition, a better seal is formed with the invention than with prior apparatus and methods, since the heat and pressure applied to opposite faces of the card provides adhesion to both sides of the blister flange. Therefore, it is to be understood that the invention is not limited to the particularly disclosed package construction which has been chosen only for the purpose of describing to those skilled in the art one application in which the invention has particularly utility.

Other features and advantages and a fuller understanding of the invention will be had by reference to the following detailed description when taken in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view illustrating the preferred embodiment of the package sealing apparatus comprising the present invention;

FIGURE 2 is an enlarged, vertical cross-sectional view of the apparatus shown in FIG. 1;

FIGURE 3 is a cross-sectional view taken on the line 3—3 of FIG. 2;

FIGURE 4 is a cross-sectional view taken on the line 4—4 of FIG. 2;

FIGURE 5 is a cross-sectional view taken on the line 5—5 of FIG. 2;

FIGURE 6 is a view similar to FIG. 3, but shows the apparatus in a different position of operation; and

FIGURE 7 is a fragmentary view of a modified embodiment of the invention.

Referring now to the drawings, and to FIGS. 1, 2 and 3 in particular, a unit display package which may be closed and sealed by the apparatus and methods of this invention is indicated by reference numeral **10**. As generally described above, the unit display package **10** comprises a folded card **11**. The card **11** has mating aperture **12** (FIG. 2) formed in each card half, and these apertures **12** preferably have the contour of the article to be packaged, such as a light bulb **13**. A sheet of plastic film **14**, such as polyethylene film, is adhered to the inner surface of the card **11** over the apertures **12**. As shown, the film **14** is drawn through the apertures to form pockets **15**

which have the contour of a portion of the product 13 and which cooperate to define a product-contoured chamber when the sections of the card 11 are secured together. If desired, a partial seal may be formed adjacent the folded edge of the card 11 so as to maintain the card in a folded condition during storage and shipment.

The sealing apparatus comprising the invention is indicated by reference numeral 20. As shown in FIG. 1, the apparatus 20 generally comprises a frame housing 21, a pair of upstanding heat sealing platens 22, 23 and a package feeding mechanism 24. Each of the platens 22, 23 are similar and, as shown at 25, may be constructed to form a seal around the pockets 15 and around the edges of the folded card 11.

Referring now to FIGS. 1–4 and 6, each of the platens 22, 23 is shown to be connected to the upper ends of a pair of upstanding pivot arms 30, 31, respectively. The upper ends of each pair of pivot arms 30, 31 extend through an opening 32 in the upper surface of the frame housing 21, the openings 32 being of a size which permits pivotal movement of the pairs of pivot arms toward and away from each other. The lower ends of the pivot arms 30 and the lower ends of the pivot arms 31 are respectively connected by shafts 33, 34.

In the illustrated construction of the apparatus 20, a laterally extending arm 40 is connected to each of the pivot arms 30 between its ends. The pivot arms 31 are similarly provided with laterally extending arms 41. The laterally extending arms 40, 41 are respectively keyed to shafts 42, 43 which have their ends journalled in spaced frame housing members 44, 45. Meshing gears 46, 47 are fixed on the shafts 42, 43, respectively, so that pivotal movement of the arms 30 causes equal and opposite movement of the arms 31.

Pivotal movement of the arms 30, 31 is effected by a fluid motor 50 which is disposed between the frame housing members 44, 45. The piston 51 of the fluid motor 50 coacts with a block 52 which is fixed on the shaft 33. Taking FIGS. 3 and 6 in conjunction, it will be seen that actuation of the motor 50 causes the arms 30 to rotate clockwise and the arms 31 to rotate counterclockwise, whereby the platens 22, 23 are moved into a substantially vertical, heat sealing position (FIG. 6). When the piston 51 is retracted, the arms 30, 31 pivot away from each other under the weight of the platens to the open position shown in FIG. 3.

As generally described above, the feeding mechanism 24 comprises a support track 60 and a reciprocal member 61. The support 60 is secured to a beam 62 of the frame housing 21 and preferably extends between the platens 22, 23 from one end of the frame housing to the other. In the embodiment shown in FIGS. 1–6, the support track 60 includes a vertical groove 63 which opens through the upper surface of the frame housing. The groove 63 is formed to receive the folded edge of the card 11 and to support it in a generally upstanding position with the product 13 disposed in the pockets 15. If desired, one end 63*a* (FIG. 5) of the groove 63 may be formed by upwardly and outwardly flaring support track walls so as to facilitate insertion of the card 11.

In the embodiment shown in FIG. 7, the support track is indicated by reference numeral 64 and includes a groove 65 which is at an angle of approximately 45 degrees from the vertical. This construction of the support track is especially suitable when packaging relatively heavy products, such as the illustrated battery 66. When the support track is vertical, relatively heavy products tend to separate the card sections and may drop out of the card pockets. However, by forming the support track groove at an angle as shown in FIG. 7, the heavy product is supported primarily by only the lowermost pocket 15*a* and this eliminates the tendency of the card halves to separate. At the same time, the weight of the product serves to force the folded edge of the card into the track groove, as it also does in the embodiment of FIGS. 1–6, whereby the cards with the inserted products may be moved along the tracks and supported at the heat sealing station out of contact with the platens.

The reciprocal member 61 comprises a vertical pusher arm adapted to engage the rear edges of a folded card 11 which is inserted into the support track 60. As shown most clearly in FIGS. 2 and 5, the pusher arm 61 is attached to the end of a piston rod 70 which extends from a double-acting fluid actuator 71. By actuating the actuator 71 to retract the piston rod 70, the pusher arm 61 is moved to feed a card to the sealing station between the platens 22, 23. When the rod 70 is extended as shown in FIG. 2, a new card may be inserted into the track groove 63 at the loading station which is defined by the track groove portion 63*a*.

In the preferred construction of the apparatus 20, the position of the actuator 71 is adjustable, whereby the feeding mechanism 24 can be operated accurately to position cards of different sizes at the sealing station. To this end, brackets 72, 73 are connected to the front and rear ends of the actuator, respectively, and these brackets are slidably engaged on a bar 74. The bar 74 extends between an end of the frame housing 21 and a block 75 which is secured to the frame housing member 55. A rod 76 is journalled in one end of the frame housing below the bar 74 and extends through the opposite end of the housing. A wheel 77 is secured to the extending end of the rod 76. The bracket 73 is slidable on the rod 76, while the bracket 72 is threadedly engaged on a threaded portion 78 of the rod. With this construction, it will be seen that rotation of the wheel 77 and the rod 76 will effect longitudinal movement of the cylinder 71. In this manner, the space between the sealing station and the arm 61, as shown in FIG. 2, can be changed to accommodate cards of different sizes.

Referring particularly to FIG. 2, air or other operating fluid is supplied to the double-acting actuator 71 through a reversing valve 85 which is connected to the front and rear ends of the actuator by conduits 86, 87, respectively. The valve 85 is connected to source by a branch conduit 88 and a main conduit 89. Operation of the valve 85 is manually initiated by an electrically connected foot pedal or other switch (not shown). When the foot pedal is operated, the valve 85 is actuated to admit fluid through the conduit 86, whereby a card is fed to the sealing station. A limit switch 90, which may be mounted on the top of the fluid motor 50, is connected to the valve 85 and is closed by an extending finger 91 below the arm 61 when a card has been fed to the sealing station. Thereupon the valve 85 is reversed to admit fluid through the conduit 87 which causes the member 61 to be returned to its original position.

The limit switch 90 also is electrically connected to a valve 92 which controls the operation of the fluid motor 50. The valve 92 is connected to the motor 50 by a conduit (not shown) and to the main conduit 89 by a conduit 93. When the limit switch 90 is closed by the finger 91, the valve 92 is operated to actuate the motor 50, whereby the platens 22, 23 are closed to effect the heat seal. Actuation of the motor 50 to close the platens is controlled in relation to return movement of the arm 61, as by provision of a suitable time delay relay between the switch 90 and the valve 92, so that the platens will not close together until the arm has been moved from between the platens. Preferably, a pressure control valve 94 having a control knob 95 (FIG. 1) is disposed in the conduit 93 for controlling the platen pressure.

The dwell of the platens 22, 23 in their closed position is controlled by a timer 96 (FIG. 1) which is also electrically connected to the limit switch 90 and the valve 92. Thus, when the limit switch 90 is closed, the timer 96 is actuated so that the platens are maintained closed for a length of time sufficient to soften the film 14 and seal the sections of the folded card 11 together. At the end of this dwell period, the valve 92 is operated to ex-

haust fluid from the motor **50**, whereby the platens are permitted to swing to their open position.

Referring to FIG. 1, suitable switches **97**, **98** are shown below the timer **96** for controlling the heat supplied to the platens **22**, **23**, respectively. Reference numeral **99** generally designates the main control panel which may include the main power switches and an emergency control.

In accordance with the preferred operation of the apparatus **20**, a series of cards **11** are inserted in the support track **60** and are disposed in edge abutment between the assembly station defined by the track portion **63***a* and the heat sealing station. Within the pocket **15** of each card is disposed the product **13** to be packaged. As explained above, the position of actuator **71** is adjusted so that the feeding stroke of the member **61** will accurately position the first card in the series at the sealing station between the platens **22**, **23**.

Thereupon the cycle of the apparatus **20** is started by the foot pedal or other switch. According to the disclosed cycle of operation, a card and product are fed as a unit to the heat sealing station and the platens are closed to apply heat and pressure to both outer faces of the card sections until the sections are sealed together. During the heat sealing of the card sections, the member **61** is returned to its original position so that a new card can be inserted in the track portion **63***a* preparatory to the next cycle. Each cycle is completed at the end of the dwell period set by the timer **96**.

As will be apparent from FIG. 2, repeated strokes of the member **61** will be effective to feed the sealed packages stepwise from the heat sealing station to the end of the support track **60**. Thereafter, each new cycle of operation will result in a package being ejected from the support track. This novel self-ejection feature will continue as long as a continuous series of cards are maintained along the track.

It will thus be seen that the apparatus comprising the invention is of relatively simple construction and yet provides for a highly efficient heat sealing operation characterized by automatic transportation of the cards and products as assembled units to the sealing station, application of heat and pressure to both sides of the cards, whereby the sealing time and the strength of the seal are markedly improved, and self-ejection of the sealed packages. Another important feature of the apparatus is its versatility in handling packages and products of different sizes.

Many modifications and variations of the invention will be apparent to those skilled in the art in view of the foregoing detailed description. Therefore, it is to be understood that, within the scope of the appended claims, the invention can be practiced otherwise than as specifically shown and described.

What is claimed is:

1. A heat sealing apparatus for card type packages comprising a loading station, a heat sealing station, card supporting and feeding means extending between said stations, said supporting and feeding means including an elongated slot opening upward to receive an edge of a card and to hold the card upright and means reciprocal along the slot for moving the card in one direction only from said loading station to said sealing station, first actuating means connected to said reciprocal means to reciprocate said reciprocal means along said slot, a pair of upstanding heated platens at said sealing station, said platens being positioned on opposite sides of said support, and means interconnecting said platens for movement toward and away from each other, said interconnecting means including second actuating means for moving said platens into heat sealing engagement with opposite faces of a card supported by said slot.

2. The apparatus as claimed in claim **1** including means operatively connecting said reciprocal means and said second actuating means so that said second actuating means is operated when said reciprocal means has moved a card to said sealing station.

3. The apparatus as claimed in claim **1** wherein said sealing station is between the ends of said support, whereby cards serially arranged along said support are sequentially ejected from one end when said reciprocal means is actuated toward said one end.

4. A heat sealing apparatus for sealing packages of the type including two card sections, an article-receiving pocket carried by at least one section, and heat sealable material between the sections, said apparatus comprising:

(a) card supporting and feeding means,

(b) said supporting and feeding means including means for engaging the card sections along one edge only to maintain the card sections of a package in an upstanding position and means for feeding the card sections from a loading station to a sealing station,

(c) an upstanding pivot arm on each side of said supporting and feeding means at the sealing station,

(d) a heated platen connected to the upper end of each pivot arm and constructed and arranged to seal the two card sections together about the periphery of an article receiving pocket,

(e) a pivot shaft pivotally mounting each of said arms for movement of said platens toward and away from each other, and

(f) actuation means operatively connected to each arm.

5. A heat sealing apparatus for sealing packages of the type including two card sections, an article-receiving pocket carried by at least one section, and heat sealable material between the sections, said apparatus comprising:

(a) card supporting and feeding means,

(b) said supporting and feeding means including

(i) means for maintaining the card sections of a package in an upstanding position,

(ii) means for feeding the card sections from a loading station to a sealing station,

(iii) an elongated horizontal track,

(iv) said track including a groove which forms said maintaining means,

(v) a card pushing element,

(vi) means mounting said element for reciprocal movement along at least a portion of said groove, and

(vii) piston-cylinder means operatively connected to said element,

(c) an upstanding pivot arm on each side of said supporting and feeding means at the sealing station,

(d) a heated platen connected to the upper end of each pivot arm,

(e) a pivot shaft pivotally mounting each of said arms for movement of said platens toward and away from each other, and

(f) actuation means operatively connected to each arm.

6. The apparatus as claimed in claim **5** including:

(1) means mounting said piston-cylinder means for longitudinal adjustment relative to said track.

7. A package heat sealing mechanism comprising:

(a) a frame having load, sealing, and eject stations;

(b) a longitudinally extending, elongated, fixed guide means delineating a package transporting path from the load to the sealing station and thence to the eject station;

(c) said guide means including a card supporting slot adapted to receive an edge portion only of a card;

(d) card transporting means mounted on the frame for transporting a card in said slot along said guide means from the load station directly to the sealing station;

(e) a pair of heated platens on opposite sides of said path; and,

(f) coordinated pressure means adapted to close said platens on said package each time a package is transported to the sealing station.

8. The mechanism of claim **7** wherein the transporting means includes pusher means to engage only one card in

the slot at a time and to move the engaged card into edge contact with a preceding card in the slot, whereby both are moved along the slot.

9. A sealing machine comprising:

(a) a frame;

(b) a longitudinally disposed track on the frame and extending from a load station to an eject station, said track defining an upwardly oriented package receiving slot;

(c) a pair of upstanding heated platens on opposite sides of the track and delineating a sealing station, said platens being mounted on the frame for relative movement from an open position to a closed position and return;

(d) a reciprocal member mounted on the frame near the load station and reciprocal in package feeding movement from a position adjacent the load station toward the sealing station and return;

(e) an adjustable feed prime mover means connected to the member for effecting reciprocal member travel adjusted according to the size of package being sealed;

(f) a platen prime mover means for selectively effecting closing and opening of the platens; and,

(g) a manually initiated control means responsive to a manually supplied signal for sequentially:

(i) actuating the feed prime mover means to move the member and feed a package from the load to the sealing station and thereafter retract the member;

(ii) actuating the platen prime mover means to close the platens when a package has been transported to the sealing station and maintain the platens in a closed condition for a predetermined time interval; and

(iii) thereafter actuating the platen prime mover to open the platens.

10. A package sealing apparatus comprising:

(a) frame means,

(b) a support track having an upwardly opening groove carried by said frame means,

(c) a pair of heat sealing platens, one of said platens being disposed on each side of said track between its ends,

(d) means for controllably heating each platen,

(e) means pivotally connecting each platen to said frame means for swinging movement on a horizontal axis between an open position and a closed position wherein said platens are substantially vertical,

(f) said pvotally connecting means including cooperating gear means for obtaining equal and opposite swinging movement of said platens,

(g) motor means operably connected to said platens for actuating them to said closed position,

(h) a pusher arm reciprocally mounted by said frame means adjacent said track,

(i) a fluid actuator connected to said arm for moving it between a first position adjacent one end of said track and a second position adjacent said platens, and

(j) means adjustably connecting said actuator to said frame means for movement along said track so that positions between which said arm is moved can be changed.

11. The apparatus as claimed in claim 10 including control means for operating said motor means and said actuator, said control means including manually initiated valve means connected to said actuator for causing movement of said arm from said first position to said second position, switch means mounted at said second position and connected to said valve means for causing return movement of said arm to said first position, means associated with said arm for actuating said switch means when said arm has been moved to said second position, and means connecting said switch means to said motor means for causing said platens to close together when said arm has been moved from said second position.

12. A heat sealing apparatus comprising a pair of heated platens; means for opening and closing said platens; means to support a package between said platens, said means including a track having a groove constructed and arranged to support the package by an edge thereof out of contact with the platens when the platens have been opened; and means to engage a package maintained in said groove at a position remote from the platens and move the package relative to the groove to a position between said platens.

13. A package heat sealing mechanism comprising: a frame having load and sealing stations; structure associated with the frame and defining an elongated slot constructed and arranged to receive, position, guide and slidably retain an edge of a card-type package; transporting means movable along said slot to directly engage only a card-type package that is slidably retained in the slot at the loading station and move the card along the slot from the load station directly to the sealing station; two opposed platens, one on each side of the slot; means to heat at least one of said platens; and means adapted to close said platens on a package slidably retained in the slot and positioned at said sealing station.

14. The mechanism of claim 13 wherein the elongated slot opens upward and is constructed and arranged to support a card-type package in an upward orientation.

15. The mechanism of claim 14 wherein the means movable along the slot is constructed and arranged to engage the package and move the package a predetermined distance along the slot, and including means to adjust the position along the slot at which the said means engages the package to accommodate different size packages.

16. The mechanism of claim 13 including means pivotally connecting each platen to the frame for swinging movement between open and closed positions about a horizontal axis extending in the direction of the elongated slot.

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