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Braber

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[54] **PACKAGING METHOD AND APPARATUS**

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[73] Assignee: **The Lehigh Press, Inc.,** Harleysville, Pa.

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[21] Appl. No.: **341,867**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 270,945, July 12, 1972, Pat. No. 3,811,564.

[52] **U.S. Cl.** **53/14,** 53/30, 53/41, 53/133, 53/184

[51] **Int. Cl.** **B65b 1/02,** B65b 43/08, B65b 61/02

[58] **Field of Search** ..... 53/30, 40, 41, 112 A, 184, 53/282, 296, 14, 133; 156/252, 253, 257, 513; 229/51 TS; 425/290, 291, 387, 388, 408

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Primary Examiner—Robert L. Spruill
Attorney, Agent, or Firm—Robert K. Youtie

[57] **ABSTRACT**

A blister packaging method and apparatus wherein a blister formed sheet is filled and closed by securement to an additional sheet, one of which sheets is scored, so that flexure of the secured sheets effects severance along the score to afford access to the contents of the blister.

7 Claims, 8 Drawing Figures

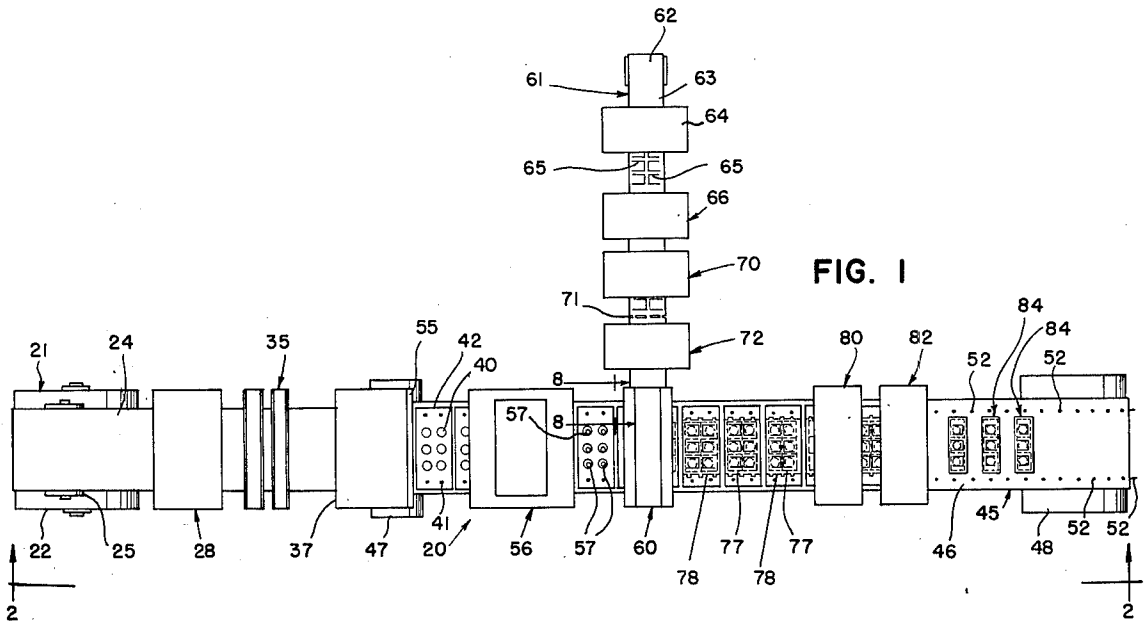


FIG. 1

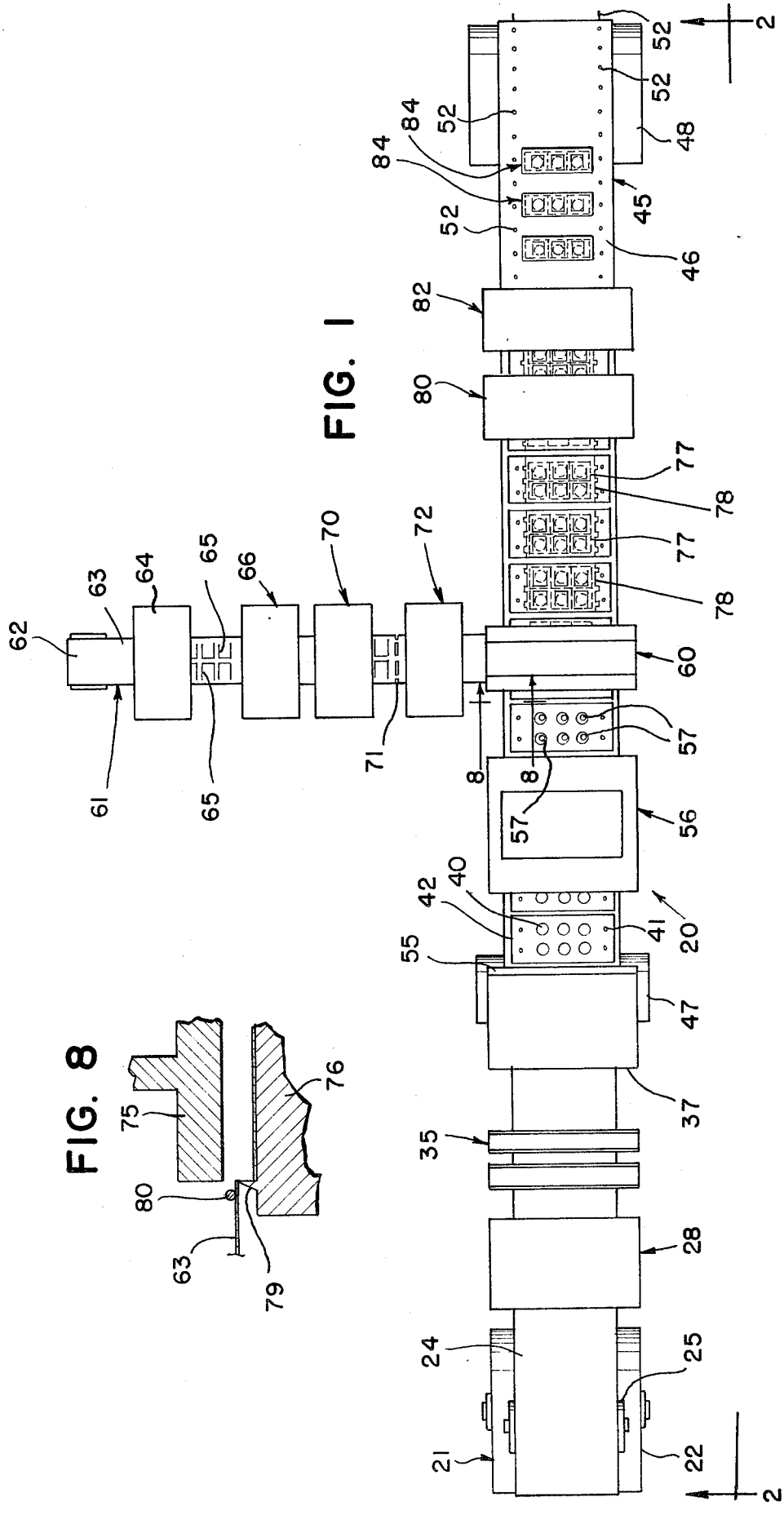

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FIG. 1

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FIG. 8

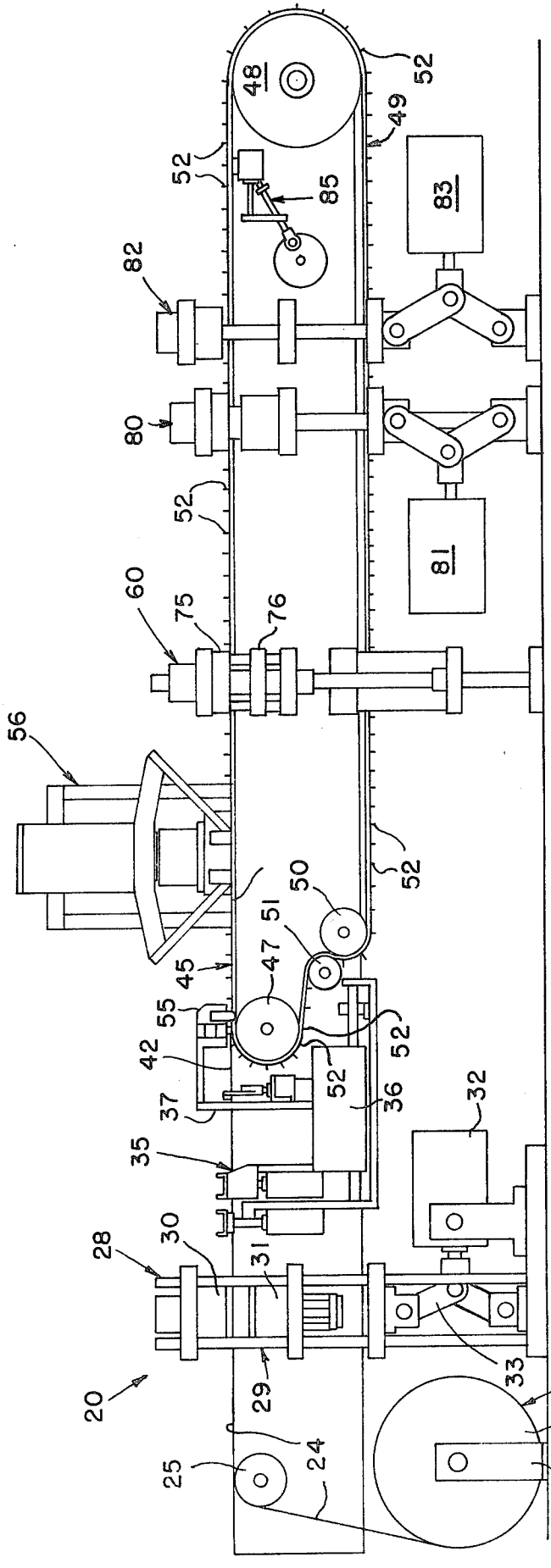

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FIG. 2

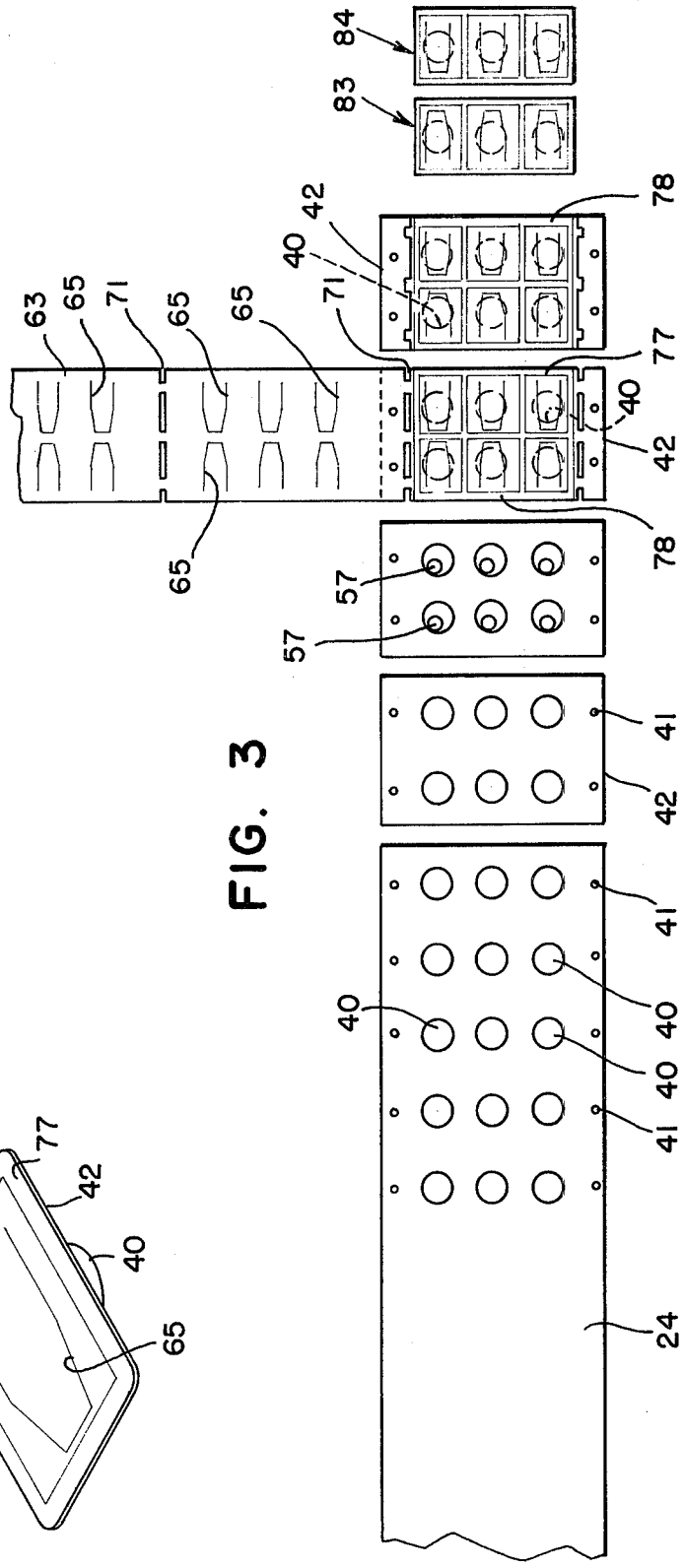

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FIG. 3

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FIG. 4

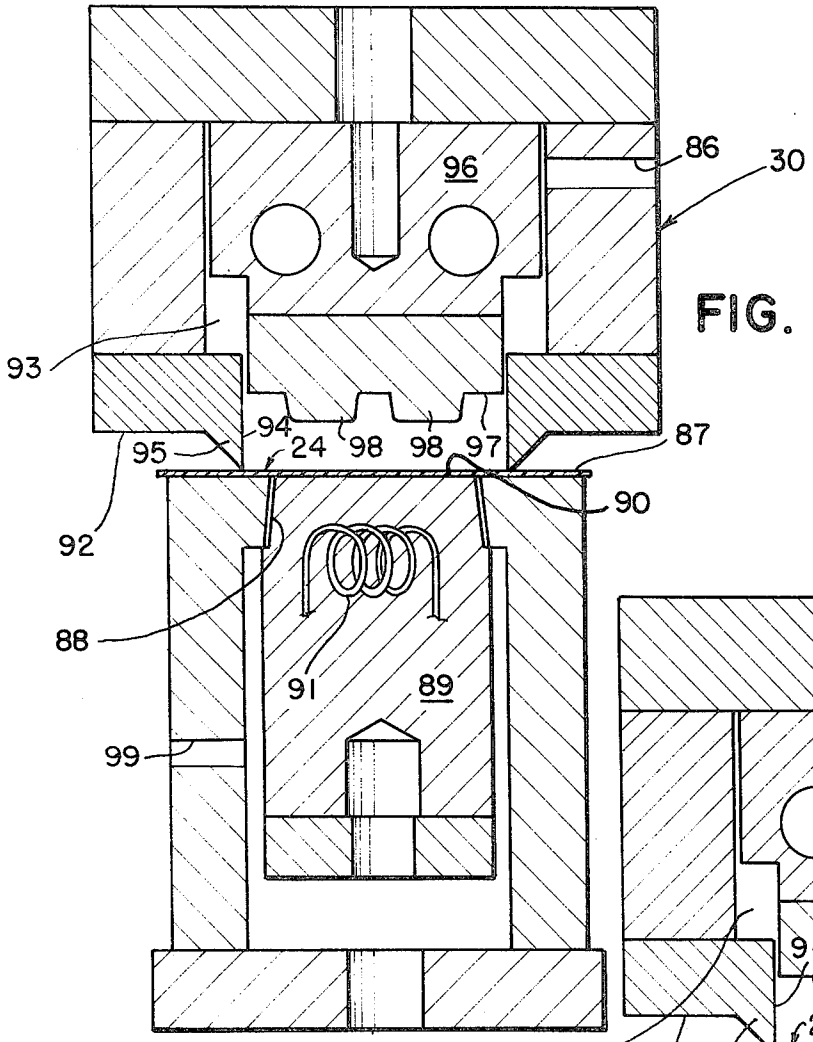
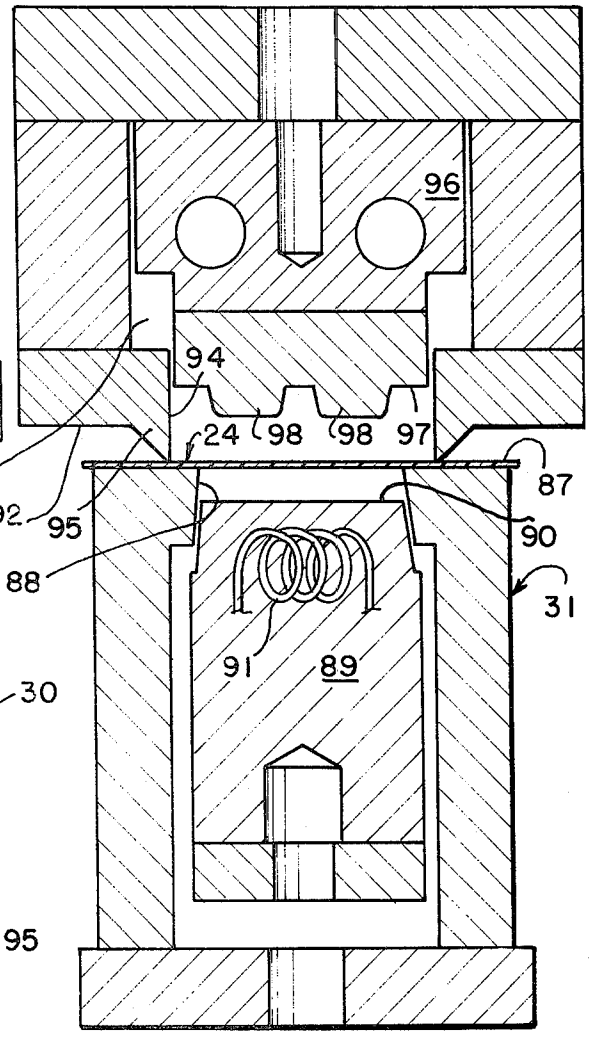


FIG. 5



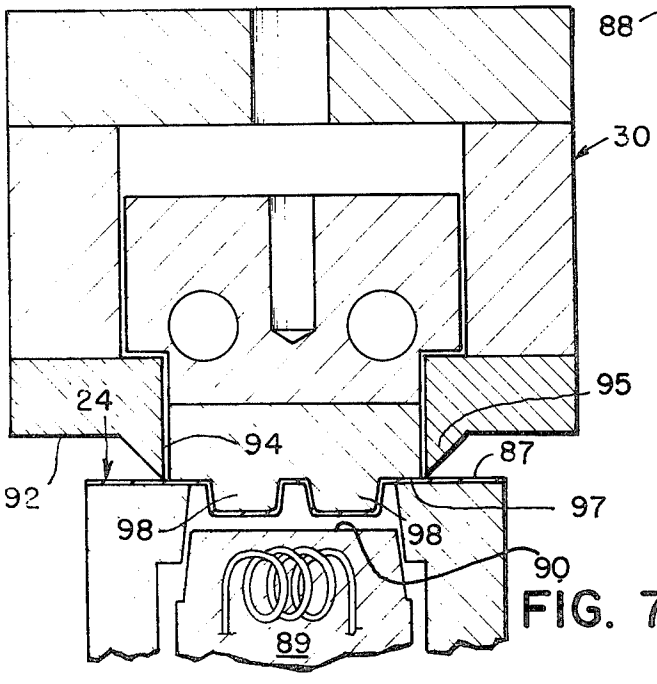


FIG. 6

FIG. 7

PACKAGING METHOD AND APPARATUS

CROSS-REFERENCES TO RELATED APPLICATIONS

This application is related to applicant's prior copending patent application Ser. No. 270,945, filed July 12, 1972 now U.S. Pat. No. 3,811,564, entitled CONTAINER CONSTRUCTION, being a Continuation-in-Part thereof.

BACKGROUND OF THE INVENTION

While the packaging method and apparatus of the present invention have been primarily developed and employed for use in the pharmaceutical industry, say for packaging of pharmaceuticals, and will be illustrated and described hereinafter with particular reference thereto, it is appreciated and understood that the advantageous features of the instant invention are capable of many varied and diverse applications, all of which are intended to be comprehended herein.

In the pharmaceutical field, the goods thereof are often packaged according to dosage, say one or two capsules, tablets or the like per packaged unit, rather than bulk packaging, so that more accurate control of drug distribution is effected and maintained. Such dosage packaged units must be relatively inexpensive to warrant their use.

In addition to the advantageous features of being sealed against contamination, it is often further desirable that the ease or facility of opening the dose pack be capable of control, say to permit of easy opening by all persons, as well as to present a degree of difficulty or lack of ease which thwarts the endeavors of young children.

SUMMARY OF THE INVENTION

It is, therefore, an important object of the present invention to provide a packaging method and apparatus which in a highly efficient and economical manner, and at substantial speed, effects packaging for drugs, and other like articles, which packaging is relatively inexpensive, attractive in appearance, capable of maintaining sterility, and wherein the degree of difficulty in opening may be predetermined in the packaging procedure.

It is still a further object of the present invention to provide a packaging method and apparatus having the advantageous characteristics mentioned in the preceding paragraph which is extremely simple for high speed and long continued use with minimum downtime, and which is capable of wide versatility for advantageous practice with widely different goods.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings, which form a material part of this disclosure.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts and method steps, which will be exemplified in the following description, and of which the scope will be indicated by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic, top plan view showing packaging apparatus of the present invention.

FIG. 2 is a sectional elevational view taken generally along the line 2—2 of FIG. 1.

FIG. 3 is a top plan view illustrating the packaging method of the present invention as practiced by the apparatus of FIGS. 1 and 2.

FIG. 4 is a top perspective view showing a package constructed in accordance with the teachings of the instant invention.

FIG. 5 is a sectional elevational view showing an initial stage of forming a blister sheet according to the instant invention.

FIG. 6 is a sectional elevational view similar to FIG. 5 showing a slightly later stage of the forming procedure.

FIG. 7 is a sectional elevational view showing a later stage of sheet forming according to the instant invention.

FIG. 8 is a partial sectional elevational view taken generally along the line 8—8 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to FIGS. 1 and 2 thereof, there is shown therein the packaging apparatus, generally designated 20, which includes package forming, fabricating and filling means.

At an upstream, inlet or feed end, leftward in FIGS. 1 and 2, there is shown a supply or source 21 of thermoplastic sheeting, say in the form of a roll 22 rotatably carried by a pedestal support 23 and adapted to let off, dispense or feed a web 24 upwardly and rightwardly over an idler roll 25. The web 24 may be vinyl, or other suitable material of appropriate thickness or gauge.

Just downstream of the idler or guide roll 25 the web 24 passes to a forming station 28 which, by thermoforming, provides downwardly bulging, upwardly facing recesses or blisters. The forming station 28 may include a generally vertical press 29 having upper and lower dies 30 and 31 suitably operated by motive means, such as a hydraulic cylinder 32 and an operating linkage 33, or other suitable means.

Downstream or rightward of the forming station 28 is a web indexing clamp 35 for clamping the web 24 and shifting or indexing the web rightwardly, downstream, say by reciprocatory shifting of an operating mechanism 36. Thus, the operating mechanism 36, which may be hydraulic or other suitably type, may shift rightward with the clamp 35 closed on the web 24 to shift the latter rightward or downstream, and may return upward or leftward with the clamp open. In this manner a predetermined length of web 24 is indexed into the forming station 28 upon each succeeding rightward shifting movement of the clamp 35. Just downstream of the clamp 35 is a cutoff mechanism or knife 37 which operates in coordination with the indexing clamp 35 to sever successive lengths of formed web 24 into separate sheets.

Referring to FIG. 3, it will there be apparent that the web 24 is provided at the forming station 28 with a plurality of blisters 40, which may be six in number arranged in two transverse rows of three blisters each. Of course, any other arrangement of blisters may be employed, as desired. Formed simultaneously with the blisters 40 may be register marks or holes 41, say being four in number corresponding to each group of six blisters 40, adjacent to opposite longitudinal edges of the web.

At the web severance station or cutoff knife 37, the web may be severed into successive generally rectangu-

lar sheets 42 each being formed with a group of six blisters 40 and a corresponding group of four register holes 41.

Extending downstream from the cutoff station or knife 37 is an endless belt, chain or conveyor 45. The conveyor 45 includes an upper run 46 extending over an upper or receiving end roll 47, and downstream therefrom to pass downwardly over a discharge end roll 48. From the underside of discharge or downstream end roll 48, upstream therefrom extends a lower run 49 of conveyor 45 passing beneath a lower idler roll 50, and extending thence upstream over an intermediate idler roll 51. The converyor, belt or chain 45 is provided on its outer surface entirely thereabout with a plurality of register members, projections or pins 52. The register members or pins 52 are arranged in a pair of laterally spaced circumferential rows, as seen in FIG. 1, adjacent to respective longitudinal edges of the conveyor 45 and appropriately spaced for interfitting engagement with the hereinbefore described register formations or holes 41 of the web 24 and the subsequently formed sheets 42.

Just downstream of the cut-off station or severance knife 37, and over the upstream end of conveyor 45 is a sheet locator 55. The sheet locator 55 places each successive sheet 42 severed from web 24 onto the upper conveyor run 46 with the sheet register holes 41 receiving the conveyor register pins 52. In this manner, each severed web sheet 42 is positively located in accurate registry with the several stations downstream of the sheet locator station 45 by indexing of the conveyor. This obviates the need for relatively difficult web registry.

Downstream of the sheet locating station 55 is a loading or filling station 56, at which the upwardly recessed blisters are properly loaded with contents, such as capsules 57, see FIGS. 1 and 3.

Downstream of the filling station 56, along the conveyor 45, is located a closing or sealing station generally designated 60. The sealing station 60, as will appear more fully hereinafter, serves to secure in sealed relation over the open upper sides of the filled blisters 40 an additional closure sheet, by suitable adhesive means, such as radiofrequency sealing, heat sealing or the like.

The apparatus 20 includes a branch conveyor or feed line generally designated 61, for feeding a closure or top sheet transversely of the conveyor 45 to the sealing station 60. The transverse supply line 61 may include a supply source, such as a roll 62 of thermoplastic sheeting, such as vinyl, or other suitable material, being led from the roll in the form of a web 63.

Adjacent to the supply roll 62, the web 63 is led to a scoring station 64, wherein the web is scored, as by heat or other suitable scoring means to form a plurality of scores or cuts 65. The scores or cuts 65 may be generally U-shaped in configuration, arranged in a pair of rows of three scores each similar to the arrangement of each group of six blisters 40, described hereinbefore. The scores each extend only partially through the web 63, so as to define a line of weakening therein, without impairing the air impervious integrity of the web.

From the scoring station 64, the web 63 may pass to a printing station 66, say for hot stamp printing, or other suitable marking, as desired.

From the printing station 66, the web 63 passes to a cutting or perforating station 70 which suitably nicks, cuts or perforates the web transversely thereacross at spaced locations intermediate each group of six scores 65. A transverse perforation or line of weakening is shown at 71, being a combination of aligned slots and edge nicks.

Thence the web 63 passes to an indexer or feeder 72 which operates in synchronism with the stepped operation of conveyor 45 to feed the web into the sealing station 60 over a sheet 42.

The sealing station 60 may include upper and lower dies 75 and 76 movable vertically into sealing relation toward each other and out of sealing relation away from each other, and suitably shaped to produce a specifically configured arrangement of sealing 77, best seen in FIGS. 1 and 3 as of a generally rectangular gridwork defining a group of contained closed configurations or rectangles, say six in number, as in the illustrated embodiment. Thus, the lower blister-formed sheet 42 and upper closure sheet are secured together about the specific configuration of the sealing 77. Any suitable actuating means may be employed with the sealing station 60, and appropriate locating means is also provided, such as a sensor of suitable type responsive to proper positioning of the web 63 at the sealing station to terminate operation of the web indexer 72.

Generally simultaneously with the above described sealing operation, at the sealing station 60, the web 63 is severed or broken along a severance line 71, whereby an end portion 78 of the web 63 is severed therefrom to define an upper or closure sheet secured in sealing relation on a lower or blister-formed sheet 42.

An advantageous mode of severing the sheet 78 from the web 63 is shown in FIG. 8, including an upstanding bar or breaker member 79 which may be fixed, say to the lower sealing die 76 in position just beneath the endmost unbroken severance line 71. Upon sealing movement of the dies 75 and 76 toward each other, the severance line 71 is broken by frangible engagement with the bar 79, and a retainer member 80 may retain the web 63 against undue flexure.

In the aforedescribed sealed relationship, lower and upper sheets 42 and 78 in the multiple unit arrangement, move downstream on the upper run of conveyor 45, the register pins 52 removably engaged in the register holes 41 to a scoring or perforating station 80. The preforating station 80 may be purely mechanical, including suitable operating means 81, see FIG. 2, or may be of the hot knife type, or other.

Downstream from the perforating or scoring station 80 may be a punch-out station 82, also having suitable operating means 83, see FIG. 2. Exiting from the punch-out station 82, say being retained on the conveyor 45, or falling through the conveyor to a suitable removable means, may be resultant packages 83, which may each include a series of individual containers detachably secured together, as by frangible scoring, or the like. Individual containers 84 may be identical to that disclosed in said copending patent application, and as seen in FIG. 4 herein and described in detail hereinafter.

As noted hereinbefore, the endless conveyor belt or chain 45 moves stepwise or intermittently, its upper run 46 moving in discreet spaced intervals through steps of predetermined length. Toward this end, a conveyor indexing means may be provided adjacent to the downstream roll 48, as at 85, the indexer 85 being reciprocable in timed relation with the hereinbefore described

components to effect the stepwise conveyor movement.

Certain unique features of the forming station **28** are shown in greater detail in FIGS. **5–7**, therebeing illustrated therein the upper die **30** and lower die **31**. The lower die **31** may include a generally flat die face **87** extending circumferentially about and bounding a die opening **88**. Located within the lower die **31** is a heating member **89** which includes a generally flat end face **90**. The heating member **89** is adapted to extend into the central opening **88** with the heating member face **90** substantially flush with the circumferential lower die face **87**. Any suitable heating means may be employed in the member **89**, a coil **91** being shown therein for purposes of illustration and without limiting intent.

The upper die **30** may be formed with a generally flat downwardly facing die surfaces **92** and a central internal hollow **93** opening as at **94** generally downwardly toward the lower die **31**. Circumscribing and bounding the opening **94** of the upper die member **30** may be a ridge or clamping edge **95**. That is, with the web or film **24** on the surface **87** of the lower die **31**, the upper and lower dies may be moved together until the projecting edge of clamping ridge **95**, extending about its closed configuration, engages the web to retain the encompassed region in position.

Mounted within the hollow **93** of upper die **31** may be an extensile and retractile die section **96**. The section **96** may include a lower, downwardly facing surface **97** movable within the opening **94** and provided with a plurality of downwardly protuberant projections or forms **98** specifically configured in the shape of desired blisters.

In the condition shown in FIG. **5**, it will be apparent that the central portion of web **24** over lower die opening **88** is being heated by contact with the lower die heating member **89**. If desired, fluid pressure, say pneumatic, may be applied to maintain the web **24** in engagement with the heating member to effect more rapid heating. For this purpose air pressure may be introduced into the hollow **93** through a port **86**.

Following the above initial step of blister formation, the heating member **89** of lower die **31** may be withdrawn or retracted downwardly in opening **88**, see FIG. **6** and the air pressure removed from the upper side of the web.

Following the above, the die section **96** of the upper die **30** may be shifted downwardly to protrude the depending projections or bosses **98** into the lower die opening **88** against the heated region of web **24**. Simultaneously, fluid pressure may be applied, say through port **99** into opening **88** of lower die **31**, against the underside of the web **24** to promptly apply the latter in conforming engagement with the forming bosses **98**, of course, die member **89** may be retracted to provide a closed chamber for the pressurized fluid. Upon upward retraction of the upper die section **96**, and upon slight lowering of the die **31**, the web **24** may be indexed downstream for repeated blister formation applied to another portion of the web.

From the foregoing it will now be appreciated that the method of the instant invention includes the feeding of web **24** and sheets **42** along the path between web supply roll **22** and the downstream end of conveyor **45**, wherein the web is blister-formed at the forming station **28** along the path, severed into sheets **42** downstream of the forming station, filled with suitable contents at the filling station **56**, and an upper or closure sheet **78** applied by sealing to the blister sheet in closing relation with the blisters. Further, it will be appreciated that the upper or closure sheet is prescored to define frangible severance lines before sealing in closing relation, which lines afford subsequent opening means upon flexure of the secured sheets to break along the scores.

It will now be further appreciated that the instant invention provides a method of packaging an apparatus therefore which is relatively simple in construction and operation, highly reliable throughout a long useful life, and which otherwise fully accomplishes its intended objects.

Referring now to FIG. **4**, it will be understood that the individual package there illustrated includes lower and upper sheet portions or sheets **42** and **78**, the former being blister formed for receiving contents, and the sheets being circumferentially secured together by marginal sealing **77**. The upper sheet **78** includes the frangible severance line, partial cut or non-through score **65**. The package is thereby hermetically sealed against contamination and openable upon flexure requiring a predetermined degree of difficulty for severance or breakage along the score **65**.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be made within the spirit of the invention.

What is claimed is:

1. A method of packaging comprising feeding a sheet along a path, forming a blister in the sheet at one location along the path, depositing contents in the blister, feeding an additional sheet into facing relation with said first-mentioned sheet at another location along the path to extend across the blister and enclose the contents, scoring one of said first-mentioned and additional sheets to form a cut extending partially through said one sheet, and securing said sheets together in said facing relation along a region of closed configuration extending about said blister and score, whereby flexure of the secured sheets along said score effects severance of the score for opening therethrough and access to the contents further characterized in forming said blister by heating said first-mentioned sheet against a platen, withdrawing a section of the platen from said first-mentioned sheet to provide an unsupported portion of sheet, and moving a forming die against the unsupported sheet portion and toward the withdrawn platen section to form said blister.

2. A method of packaging according to claim **1**, further characterized in applying fluid pressure to hold said first mentioned sheet against said platen, for effective heating of said first-mentioned sheet.

3. A method of packaging according to claim **1**, further characterized in applying fluid pressure to hold said first-mentioned sheet against said forming die to accurately form said first-mentioned sheet.

4. A method of packaging according to claim **1**, said feeding of said additional sheet being further characterized in stepwise drawing of an additional web of sheeting from an additional roll for intermittent movement to said other location, forming frangible transverse regions in said additional web, and breaking said regions at said other location to define of said additional web said additional sheet in said facing relation.

5. Packaging apparatus comprising a forming station for blister-forming a sheet, conveying means for conveying a blister-formed sheet from said station, a filling station along said conveying means for filling the blisters, a scoring station spaced laterally from said conveyor for scoring a sheet to form cuts partially through the scored sheet, feeding means for feeding the scored sheet onto said conveyor means into facing relation with the blister formed sheet, and a sealing station along said conveyor means for sealing said blister-formed and scored sheets together in said facing relation, said forming station comprising a heating platen having a withdrawable section, and a mail die for entry into the space vacated by said withdrawable section when withdrawn.

6. Packaging apparatus according to claim 5, in combination with fluid pressure means for initially applying said first-mentioned sheet against said platen to heat the latter sheet and subsequently applying the latter sheet against said male die to form the sheet.

7. Packaging apparatus according to claim 1, in combination with bending means at said sealing station for bending adjacent scored sheets to break apart the same upon sealing.

* * * * *