

[54] SINGLE DOSAGE PACKAGING APPARATUS  
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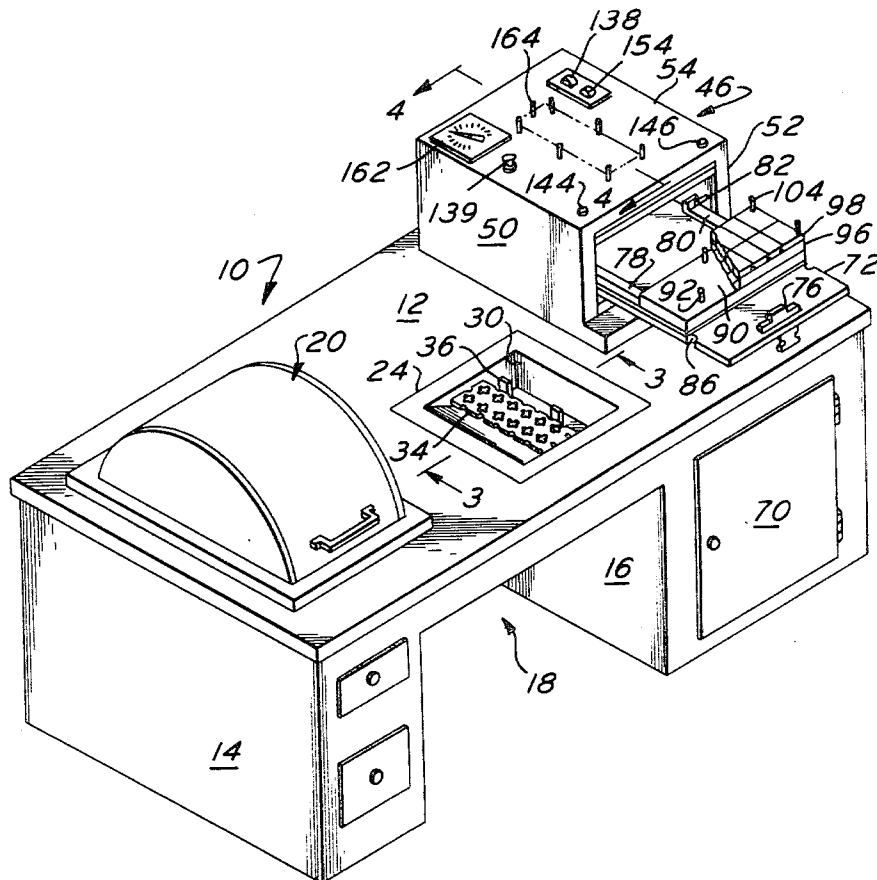
[57] ABSTRACT

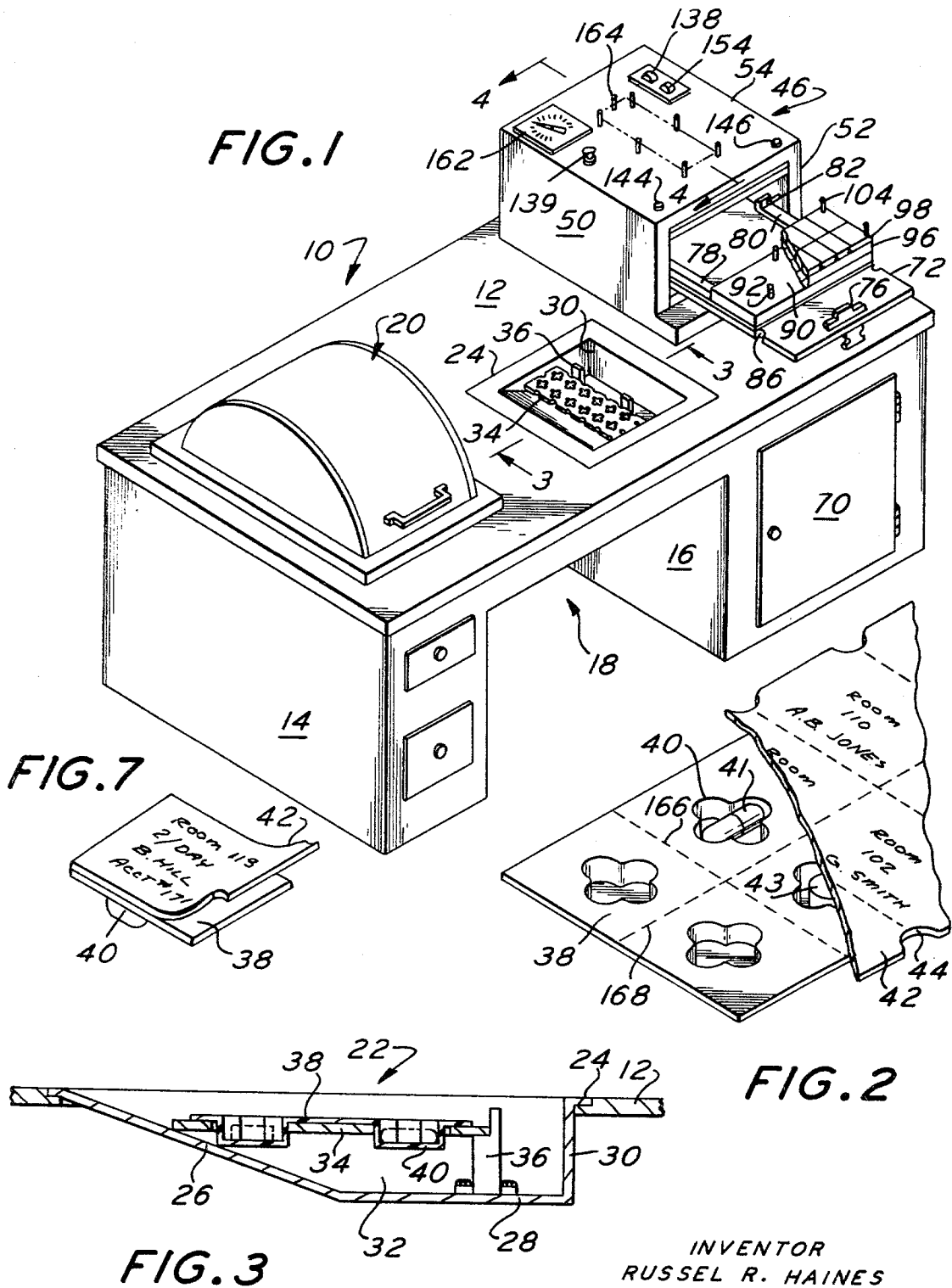
Apparatus is disclosed for custom blister-packaging a plurality of single dosages of pharmaceuticals with each dosage appropriately identified as to the user. The apparatus is for use by hospitals, nursing homes, large pharmaceutical dispensers and the like.

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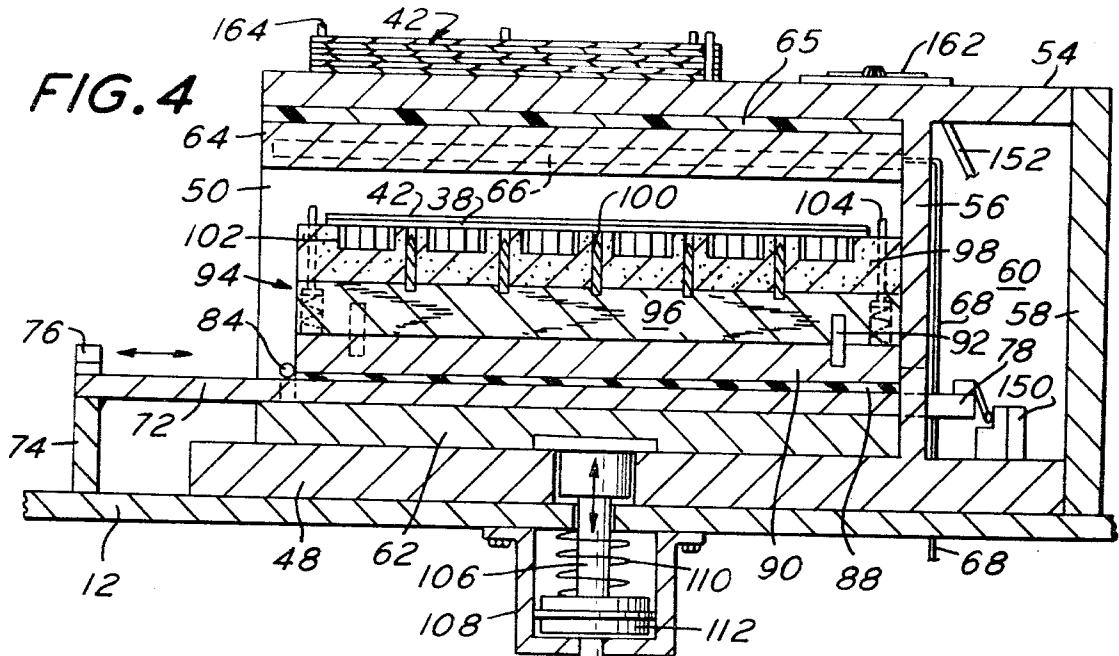
11 Claims, 7 Drawing Figures



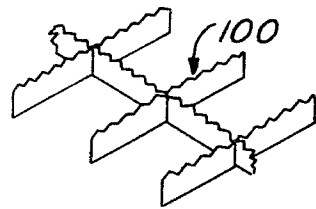
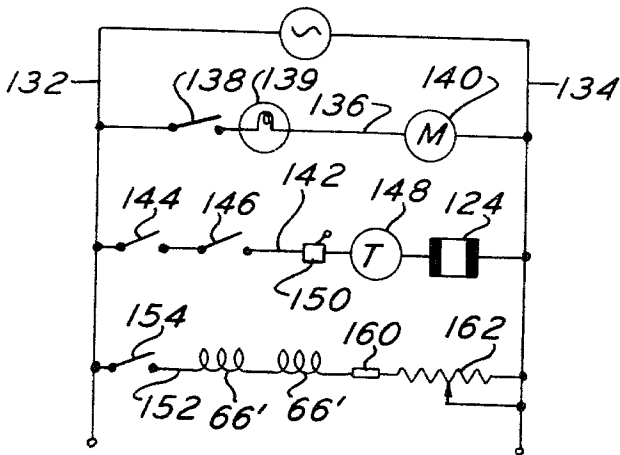
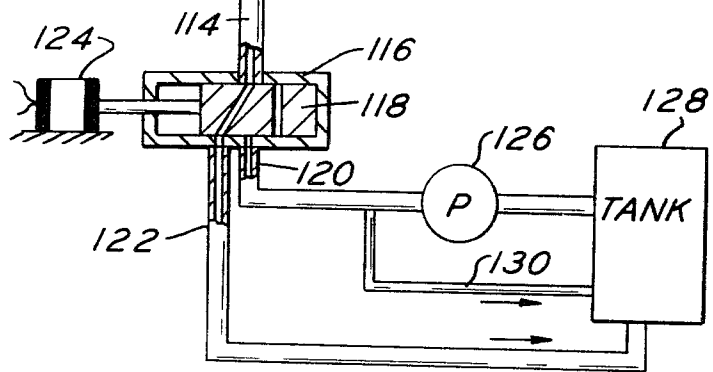


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**FIG. 6**



**FIG. 5**

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**SINGLE DOSAGE PACKAGING APPARATUS**

This invention relates to a single dosage packaging apparatus, and more particularly, to an apparatus which is particularly designed and structurally interrelated in a manner whereby it may be used by hospitals, nursing homes, large pharmaceutical dispensers, and the like. In each of these institutions, there is an increasing usage of single dosages of pharmaceuticals.

Heretofore, it has been conventional for many years in a hospital to prepare various pharmaceutical pills, capsules and the like for the various patients from a master list. A tray is assembled with little cups containing the various pills and capsules each with a little note indicating the name and room number of the patient and any special instructions with respect to the same. Evidence has been increasingly available over the last decade to indicate that this manner of dispensing pharmaceuticals to patients in hospitals and other institutions has not been satisfactory. There is an increasingly large number of lawsuits generated by nurses dispensing the wrong pharmaceuticals to a patient. The placing of pharmaceuticals into a small paper cup in a hospital pharmacy with subsequent transmission to the patient frequently results in the tray being dropped with the various pharmaceutical tablets or capsules becoming hopelessly mixed so that it is virtually impossible to ascertain which patient receives which pharmaceutical product.

Recently, there has been a trend to prepare pharmaceuticals in single dosages. Instead of introducing 100 aspirins into a bottle, the trend is to individually package each aspirin. When the pharmaceuticals are likely to have a dangerous result on inadvertent users, this system does prevent a child or some other person from taking a large number of pharmaceuticals simultaneously.

The present invention is directed to an apparatus which will facilitate hospitals, nursing homes, large pharmaceutical dispensers and the like to custom blister-package a plurality of single dosages of pharmaceuticals in a manner whereby each single dosage will be appropriately identified as to the patient, customer, and the like. The apparatus is personal so that pills or capsules may be packaged by the hospital pharmacy. Thereafter, the pharmaceuticals are appropriately identified so as to materially reduce any mistakes. The patient, users, client, customer or the like, may read the indicia on the single dosage and ascertain for himself that this is the pharmaceutical prescribed for him.

It is an object of the present invention to provide an apparatus and method for custom hermetically-packaging a plurality of single dosages of pharmaceuticals.

It is an object of the present invention to provide a custom blister-packaging machine which enables a hospital, nursing home, large dispenser of pharmaceuticals or the like to custom hermetically seal single dosages of pharmaceuticals.

It is another object of the present invention to provide a custom packaging machine structurally interrelated in a manner which is simple, reliable, and contains all of the necessary features to facilitate a custom packaging operation on a small scale.

It is another object of the present invention to provide a custom packaging machine which offers versatility to the user so that the pharmaceuticals may be appropriately identified with a particular person by means

of surnames, room numbers, secret codes, file numbers, etc.

It is another object of the present invention to provide a custom packaging machine which is structurally interrelated in a manner so that it may be operated with minimum experience.

It is another object to provide a method of custom packaging single dosages of pharmaceuticals with each dosage appropriately identified.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a perspective view of the apparatus of the present invention.

FIG. 2 is a partial perspective view of the product of the apparatus of the present invention in the form of a plurality of separable single dosages of pharmaceuticals.

FIG. 3 is a sectional view taken along the line 3—3 in FIG. 1.

FIG. 4 is a sectional view taken along the line 4—4 in FIG. 1.

FIG. 5 is a perspective view of the perforating blades. FIG. 6 is a diagrammatic circuit diagram.

FIG. 7 is a perspective view of a single dosage package.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIG. 1 apparatus for custom packaging a plurality of single dosages of pharmaceuticals in accordance with the present invention designated generally as 10.

The apparatus 10 includes a support surface such as a table 12 mounted on a support leg structure 14 at one end and a support leg structure 16 at the other end. In this manner, there is provided a gap 18 between the leg structures 14 and 16. The operator of the apparatus 10 may sit on a stool or chair with his legs beneath the table 12 in the gap 18.

The leg structure 14 includes a plurality of drawers which facilitate storage of various components as will be made clear hereinafter. Above the leg structure 14, on the table 12, there is removably secured thereto a stencil duplicating machine which may be any one of a wide variety of commercially available machines such as a DITTO machine.

In the center of the table 12, above the gap 18, the table 12 is provided with a cut-out portion terminating in a horizontally disposed inwardly extending flange. A tray designated generally as 22 is supported by the table flange. Tray 22 includes an outwardly directed flange 24 which overlies the flange on the table top 12 so as to be flush therewith. See FIG. 3.

The tray 22, at one end, is provided with a sloping wall 26 which merges into a horizontally disposed wall 28. The tray 22 includes side walls 32 and an end wall 30.

A jig 36 having a shoulder opposite the sloping wall 26 is adjustably supported in any convenient manner by the bottom wall 28. A loading plate 34 has one end supported by a shoulder on the jig 36 with its opposite end supported by the sloping wall 28. Due to this structural interrelationship, loading trays 34 of varying lengths may be accommodated. The loading tray 34 is preferably a layer of plastic material having a thickness ap-

proximately three-eighths of an inch and having a plurality of perforations therethrough. The perforations may be circular, elliptical, or X-shaped.

A preformed blister sheet 38 is provided with pockets at spaced points therealong. The pockets are X-shaped so as to accommodate either a capsule 41 or a pill 43. The pockets 40 are adapted to extend through the apertures in the loading plate 34. See FIG. 3.

A cover sheet 42 having notches 44 along its edges is adapted to be joined to the blister sheet 38 to thereby seal the pharmaceuticals in the various pockets 40 on the blister sheet 38.

The blister sheet 38 may be preformed in any one of a wide variety of commercially available devices. The sheet 38 may be any one of a wide variety of plastics but preferably is a transparent vinyl. The cover sheet 42 is wider than the width of the sheet 38 and is multilayers and opaque. An aluminum foil layer, coated with vinyl, is juxtaposed to the uppermost surface on the blister sheet 38. The uppermost layer of sheet 42 is untreated paper laminated to the foil.

The untreated paper layer of the sheet 42 is preprocessed so as to contain indicia thereon corresponding to the desires of the operator of the apparatus 10. When used in a hospital the indicia could include the name of a patient, his room number, a code number indicating the type of pharmaceutical product, the account number of the patient so that finance may bill the patient, etc.

The indicia on the paper layer of sheet 42 is applied by means of the machine 20. A typical manner in which this may be accomplished is as follows. Starting out with a sheet of the same size as sheet 42, excluding the notches, the various indicia will be typed thereon and automatically transferred by a carbon layer to a spirit master. The spirit master will be utilized in the machine 20 to transfer the information to the paper layer of sheet 42.

A sealing machine designated generally as 46 is mounted on the table 12 at the end remote from the machine 20. The sealing machine 46 is utilized to seal the sheets 38 and 42 to thereby encapsulate the pharmaceuticals 41, 43 within the pockets.

The sealing machine 48 includes a housing which can assume a wide variety of shapes and may be an integral casting, comprised of a plurality of plates bolted together, etc. The housing includes a base plate 48 connected to side walls 50 and 52. The top wall 54 extends across the side walls. The housing includes a vertical partition 56 spaced from the rear wall 58 so as to define therebetween a chamber 60.

A vertically movable lower platen 62 is supported by the base plate 48. A stationary upper platen 64 is supported by the top wall 54 with a layer of insulation 65 therebetween. The upper platen 64 has imbedded therein a plurality of heater cartridges 66.

Electrical wires 68 for the heater cartridges 66 extend through the chamber 60 and the base plate 48 into the hollow interior of the support leg structure 16. An access door 70 is provided on the structure 16 to facilitate access to the circuitry, coils, timers, valves, pump and other matter disposed entirely therewithin. Hence, the apparatus 10 is an integrated unit with all components forming a part thereof so as not to require additional structure to be supported separately from the apparatus 10. Hence, the apparatus 10 is structurally interrelated in a manner so as to be complete in and of

itself and occupy a minimum of floor space. Thus, the apparatus 10 can occupy approximately the same floor space as a conventional desk.

A slide plate 72 is provided. A spacer 74 secured to the lower surface of plate 72 rides on the table 12 and maintains the plate 72 supported at one end. The other end of plate 72 is at all times supported by the lower platen 62. A knob 76 may be provided at one end of the plate 72 to provide a convenient surface to facilitate reciprocating the plate 72 from the open disposition shown in FIG. 1 to the closed disposition shown in FIG. 4.

The slide plate 72 is provided with extensions 78 and 80 on its rear end which are adapted to cooperate with limit stop pins 84 and 82, respectively. The partition 56 is provided with cut-out portions so that the extensions 78 and 80 may extend therethrough in the closed disposition shown in FIG. 4. As shown more clearly in FIG. 1, the plate 72 is provided with notches 86 on opposite sides thereof which will be aligned with the limit stop pins 82 and 84 in the closed disposition of the slide plate 72 as shown in FIG. 4.

As shown more clearly in FIG. 4, a rubber pad 88 overlies the plate 72. A mounting plate 90 overlies the pad 88. Mounting plate 90 is fixedly secured to the plate 72 in any convenient manner such as by bolts or screws. A plurality of locator pins 92 are provided on the upper surface of plate 90. See Fig. 1.

A die plate 94 is adapted to be removably supported on the plate 90. The pins 92 assist in properly locating the die plate 94 with respect to the mounting plate 90. In this regard, the die plate 94 includes a layer of wood 96 having blind holes on its bottom surface adapted to receive the pins 92.

A layer of cork or other compressible material is secured to the uppermost surface of the layer 96. A plurality of perforating blades 100 are secured to the layer of wood 96 and extend upwardly through and between adjacent portions of the layer of cork 98 so as to define a criss-cross pattern. The height of the blades 100 is slightly less than the thickness of the layer of cork 98 as will be apparent from FIG. 4.

The layer of cork 98 is provided with a plurality of cavities 102 in its uppermost surface. Each of the cavities 102 is adapted to receive one of the pockets 40 on the sheet 38. The layer of wood 96 is provided with a plurality of parallel, spaced pins 104 spring-biased upwardly to a sufficient height so as to project beyond the uppermost surface of the layer of cork 98. The pins 104 cooperate with the notches 44 on the sheet 42 to properly orientate the sheet 42 with respect to the die plate 94. The sheet 38 is already properly located with respect to the die plate 94 since the pockets 40 enter the cavities 102. In this manner, the sheets 38 and 42 are orientated with respect to each other.

A piston rod 106 is fixedly secured to the bottom surface of the lower platen 62 in any convenient manner. Piston rod 106 extends through a hole in a base plate 48 aligned with a hole in the table 12. A cylinder 108 is removably secured to the bottom surface of table 12 in any convenient manner aligned with the piston rod 106 which extends thereto. A spring 108 extends from the lower surface of table 12 and engages a piston 112 biasing the same downwardly in FIG. 4.

The piston 112 may be selectively caused to move upwardly in FIG. 4 by introducing motive fluid such as oil underpressure into the cylinder 108 below the pis-

ton 112. In this regard, there is provided a conduit 114 which communicates with the cylinder 108 below the piston 112. The end of conduit 114 remote from the cylinder 108 is connected to a supply and exhaust valve 116.

The supply and exhaust valve 116 includes a slidable valve member 118. Other types of valve members which rotate or pivot may be utilized. The particular type of supply and exhaust valve utilized is not material. Movement of valve member 118 selectively places conduit 114 in communication with either conduit 120 or conduit 122. Movement of valve member 118 is effected by a solenoid 124.

The conduit 120 includes a pump 126 having its inlet side connected to a tank 128. The outlet side of the pump 126 is connected to the tank 128 by a small bypass conduit 130. The end of conduit 122 remote from the valve 116 is also connected to the tank 128.

Referring to the schematic circuit diagram shown in FIG. 6, it will be noted that a source of alternating current is coupled across conductors 132 and 134. A conductor 136 extends between conductors 132 and 134 and contains in series an on-off switch 138, an indicator light 139, and motor 140. Motor 140 is coupled to operate the pump 126.

Conductor 142 extends across conductors 132 and 134. Conductor 142 contains in series manually operable on-off switches 144 and 146, a microswitch 150 adapted to be actuated by the extension 78 on plate 72, a timer 148 and solenoid 124. When switches 144, 146 and 150 are closed, current flows through the solenoid 124 until the timer 148 times out. Solenoid 124 is preferably the push-pull type.

A conductor 152 is coupled across the conductors 132 and 134. Conductor 152 includes in series an on-off switch 154, coils 66' associated with the heater cartridges 66, a thermostat 160, and a variable rheostat 162. The rheostat 162 is preferably mounted on the top wall 54 as shown more clearly in FIGS 1 and 4.

A supply of the sheets 42 may be conveniently stored on the top wall 54 of the sealing machine housing. A plurality of pins 164 are provided so as to cooperate with the notches 44 on the sheets 42 and thereby facilitate a stack of sheets properly stored for subsequent usage.

The apparatus 10 may be utilized as follows.

The stencils, sheets 38, loading plates 34, sheets 42, and the like as well as the guide plate 94 may be stored in the drawers of support leg structure 14. The drawers are preferably of the type adapted to be locked. In this manner, utilization of the apparatus 10 by an unauthorized personnel is prevented. Access door 70 is preferably also provided with a lock so as to prevent unauthorized personnel from tampering with the circuitry, valves, pumps, and the like disposed within the support leg structure 16.

A master list of patients, customers, and the like with the corresponding type of pharmaceuticals is prepared. From this list, a stencil master is prepared corresponding in shape to the sheets 42. Thereafter, sheets 42 are processed by the machine 20 so as to have stenciled thereon the pertinent information associated with a single dosage of a pharmaceutical such as the name and room number of the patient who received the capsule 41 and the relevant information with respect to the pill 43.

Thereafter, the loading plate 34 is positioned as illustrated in FIG. 1. A sheet 38 is superimposed over the plate 34 as shown in FIG. 3. Using the information stenciled onto the paper side of sheet 42 as a guide, the various pockets 40 are filled with the various pharmaceutical products destined for the various patients appearing on sheet 42. Thereafter, the loaded sheet 38 is placed onto the die plate 94.

The knob 76 will have been previously manipulated to cause the plate 72 to assume the loading position shown in Fig. 1, thereby exposing the cavities 102 which are adapted to receive the various pockets 40. Thereafter, the sheet 42 is superimposed over the sheet 38 with the indicia on the uppermost surface and orientated with respect to pockets. The pins 104 cooperate with the notches 44 on the sheet 42 to properly orientate sheet 42 with respect to the die plate 94. Thus, at this point, it will be noted that indicia appears on sheet 42 directly above each of the pockets on sheet 38.

As pointed out above, the indicia on the paper layer of sheet 42 need not be limited to the name of the patient and his room number. Other indicia such as the type of pharmaceutical product, the frequency with which it could be used, any special instructions when taking the pharmaceutical, etc. may be utilized.

Thereafter, the slide plate 72 is moved to the sealing position shown in FIG. 4. The partition 56 acts as a limit stop. When the slide plate 72 has been fully moved to its closed or sealing position, the extension 78 will trip a microswitch 150. Also, pins 82 and 84 will be aligned with one of the notches 86 in the plate 72.

On-off switch 138 may then be pressed which will immediately cause pump 126 to circulate hydraulic liquid such as oil. Also, the indicator light 139 will turn on. Then switch 154 should be closed to cause the heater cartridges 166 to heat the upper platen 64. The temperature of the heater cartridges may be selectively varied by manipulating the rheostat 162. Overheating is prevented by the thermostat 160.

Thereafter, the operator must push switch 144 with one hand and switch 146 with the other hand. These switches are spaced a sufficient distance apart whereby the operator must use both of his hands. In this manner, a safety feature is provided so as to prevent the operator from having his fingers crushed.

When both of the switches 144 and 146 are moved to an on position, and assuming that the plate 72 has been moved to a fully closed position so as to close microswitch 150, the timer 148 will be activated and solenoid 124 will be activated.

Activation of solenoid 124 will cause the valve member 118 to move to the left in FIG. 4, thereby placing conduits 120 and 114 in communication with one another. Oil is pumped by pump 126 into the cylinder 108 thereby raising the piston 112 and the lower platen 62 and the structure supported thereon including plate 72, die plate 94, etc. Upward movement continues until the sheet 44 contacts the stationary heated upper platen 64 and sufficient pressure is applied so as to deform the layer of cork 98 whereby the perforating blades 100 will perforate sheets 38 and 42 along the perforation lines 166 and 168. See FIG. 2. The perforation lines 166 and 168 divide the sheets 38 and 42 into single dosages each including a pharmaceutical product within one of the pockets 40 with appropriate indicia on the sheet 42 relating to the type of pharmaceutical and the intended recipient for the same.

The timer 148 will time out after a short period of time such as three seconds, thereby breaking the circuit to the solenoid 124. When this occurs, the valve member 116 is shifted to the position shown in FIG. 4 whereby the cylinder 108 is vented to the tank 128 by way of conduit 122. Thereafter, the pump 126 will continue to recycle oil through the bypass conduit 130 which is of smaller flow capacity than the conduit 120. Thereafter, the spring 110 will bias piston 112 downwardly thereby carrying with it the lower platen 62 and the structures supported thereby.

As soon as the slide plate 72 has reached its lowermost position as shown in FIG. 4, the operator may then release the switches 144 and 146. Switches 138 and 154 may remain in an on position if another set of pharmaceuticals is to be packaged in the same manner. Otherwise, the switches may then be turned to an off position. Thereafter, the operator reciprocates the plate 72 to an open disposition as shown in FIG. 1. The blister-package may then be removed from the upper surface of the guide plate 94.

The entire multi-component single dosage package may then be forwarded to appropriate portions of the hospital or nursing home for subdivision by a nurse at a later time. Subdividing the package is readily facilitated by tearing along one of the perforation lines 166 and 168. Access to the pharmaceutical product such as capsule 41 or pill 43 is attained by separating sheets 38 and 42 of the single dosage package. A tab is provided on one side of the single dosage package due to the fact that sheet 42 was substantially wider than sheet 38. See FIG. 7.

The temperature of the upper platen 64 is selectively adjustable by means of the rheostat 162. When using vinyl plastic for sheet 38 and the coating on sheet 42, a temperature range of 240°F to 250°F is satisfactory. Depending on the thickness of the compressible layer 98, the pressure applied by piston rod 106 may be varied. When using cork having a thickness of three-eighths inches for the layer 98, I apply pressure to the die plate 94 of approximately 1,450 to 1,500 psi. These figures are exemplary and are based on operative embodiments wherein layer 42 had a thickness of 0.010 inches and layer 38 had a thickness of 0.010 inches. Temperature and pressure ranges may vary depending on a variety of factors including nature of materials being sealed, nature of layer 98, static weight of load to be lifted, etc.

The pharmaceutical product which may be hermetically sealed in single dosages by this invention is not limited to pills or capsules. For example, the product may be a disposable syringe and a container of injectable medicine in liquid form. The fact that the seal is hermetic is particularly desirable in connection with many pharmaceutical products whose potency decreases when subjected to air or moisture.

The present invention enables pharmaceutical products to be custom-packaged and stored. The indicia applied to sheet 42 may only be the generic name of the product and a lot number or date before which the product should be used. When dispensed, the name of the recipient may be added in ink to sheet 42 whereby all of the advantages of this invention are retained.

The pockets 40 need not be X-shaped as illustrated. Thus, sheets 38 can be made with round pockets for pills, elongated pockets for capsules, and irregular

shapes for other products such as a syringe and an injectable.

The cutting edges on blades 100 are disconnected so that the cutting action results in perforations in sheets 38 and 42. This has the advantage of producing a plurality of single dosage packages which are interconnected for ease of handling but yet are readily disconnectable. If desired, the cutting edges on blades 100 could be continuous so that each single dosage package is discrete and readily accessible on top of the die plate 94 after the sealing operation. Since the blades 100 are recessed in the layer 98, there is no danger to the fingers of personnel when taking the individual packages off the layer 98.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than the foregoing specification as indicating the scope of the invention.

I claim:

1. Apparatus for custom blister-packaging a plurality of single dosages of pharmaceuticals with each dosage appropriately identified as to the intended recipient comprising a support table having leg means for supporting the same, means on the table for supporting a first sheet having pockets so that pharmaceuticals to be packaged may be put into the pockets, a sealing machine on said table adjacent said last-mentioned means for sealing a second sheet in overlying relation to said first sheet by means of heat and pressure, said machine including a housing having a lower platen and a heated upper platen above said lower platen, a die plate having means for supporting said sheets in superimposed orientated relationship so that indicia on said second sheet corresponds to at least one specific pocket on said first sheet, means for supporting said die plate in a loading position and reciprocating said die plate relative to said housing to a position wherein the die plate is between said platens and overlies said lower platen, hydraulic means for moving the lower platen and die plate upwardly against the heated upper platen when the die plate is in its sealing position, said last-mentioned means including a piston and a closed circuit hydraulic system, a valve for controlling flow of a hydraulic liquid to one face of said piston.

2. Apparatus in accordance with claim 1 wherein said means on said table for supporting a first sheet during the placement of pharmaceuticals into the pockets includes a tray, said tray being supported by said table, said tray having a sloping wall connected to a horizontal bottom wall, a jig supported by said bottom wall, said jig having means for supporting one end of a loading plate while the other end of the loading plate is supported by said sloping wall.

3. A sealing machine to be used as part of an apparatus for custom blister-packaging a plurality of single dosages of pharmaceuticals with each dosage appropriately identified as to the intended recipient comprising a housing, said housing having means for supporting a die plate reciprocable from a loading position outside the housing to a sealing position inside the housing, said die plate having means for supporting first and second sheets in a superimposed orientated relationship so that indicia on one sheet corresponds to a pocket on the other sheet, said die plate having blade means for perforating said sheets, a heated upper platen in said hous-

ing, and means for selectively moving the die plate upwardly into contact with the upper platen to effect a sealing action between the sheets by means of heat and pressure.

4. Apparatus in accordance with claim 3 wherein said die plate includes a layer of wood having a layer of compressible material thereon, said blade means including blades supported by said wood and being disposed between adjacent portions of said layer of compressible material, said layer of compressible material having cavities between adjacent blades for receiving pockets on the first sheet, and said die plate including pins for orientating said second sheet with respect to the first sheet.

5. A machine in accordance with claim 3 wherein the means for supporting the die plate includes a reciprocable slide plate, said slide plate being supported by a lower platen, said die plate being supported by said slide plate, and said means for moving the die plate upwardly including a piston rod connected to the lower platen and extending into a cylinder supported below said platen, means for introducing a hydraulic liquid into said cylinder to raise said platen, and means for exhausting said cylinder.

6. A sealing machine in accordance with claim 3 wherein said die plate includes a layer of wood having thereon a layer of compressible material, said layer of compressible material having cavities for receiving pockets on said other sheet, said blade means including blades supported by said layer of wood and extending through said layer of compressible material between adjacent cavities.

7. Apparatus for custom blister-packaging a plurality of single dosages of pharmaceuticals with each dosage appropriately identified as to the intended recipient comprising a support table, means on said table for supporting and loading a first sheet having pockets so that pharmaceuticals to be packaged may be put into the

pockets, a sealing machine on said table adjacent said last-mentioned means for sealing a second sheet in overlying relation to said first sheet by means of heat and pressure, said machine including a die plate having means for supporting said sheets in superimposed orientated relationship so that indicia on said second sheet corresponds to at least one specific pocket on said first sheet, a lower platen, a heated upper platen above said lower platen, a slide plate for supporting said die plate in a loading position and reciprocating the die plate relative to the lower platen to a sealing position wherein the die plate overlies the lower platen, means supported by said table and including a piston coupled to said lower platen for moving the lower platen and die plate upwardly against the heated upper platen when the die plate is in its sealing position.

8. Apparatus in accordance with claim 7 including a switch responsive to said slide plate when the latter overlies the lower platen, said switch being coupled to circuitry for moving the piston upwardly toward the heated upper platen.

9. Apparatus in accordance with claim 7 including discontinuous blades adjacent said sheets for perforating said sheets with intersecting perforation lines while the sheets are being heat-sealed under heat and pressure between said platens.

10. Apparatus in accordance with claim 7 wherein said last-mentioned means include a pump and reservoir below the elevation of said lower platen, and circuitry controls mounted on a horizontal surface immediately above said upper platen.

11. Apparatus in accordance with claim 7 wherein said last-mentioned means includes a closed circuit hydraulic system, a valve for controlling flow of a hydraulic fluid to one face of the piston, and spring return means for an opposite face of the piston.

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