

[54] PACKAGE CUT-OUT APPARATUS

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[51] Int. Cl. **B65b 51/30, B65b 9/12, B65b 61/04**

[58] Field of Search..... **53/180 R, 182, 296, 297, 53/298, 329, 373, 191, 184 R, 112 A; 156/583; 83/337, 338**

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Primary Examiner—Robert L. Spruill

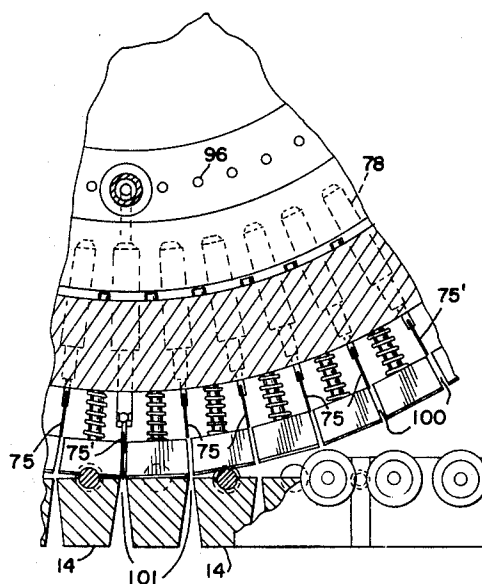
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[57] ABSTRACT

In package-forming apparatus for individually packaging elongated articles such as small sausages between opposing, continuous webs of sealable film means are provided for completely separating or cutting out groups of the individually packaged articles while partially severing the articles in each group for ready separation from each other. In a preferred embodiment a predetermined number of these packaged articles, e.g. five, is completely severed with each of the five articles in the group being partially severed from each other along a readily separable line of perforation. The mechanism for severing and perforating the individually packaged articles is mounted around the periphery or rim of a wheel structure disposed for rotation over the discharge end of the upper run of an endless chain of lower die plates having cavities for receiving the lower portions of each individual article.

9 Claims, 6 Drawing Figures



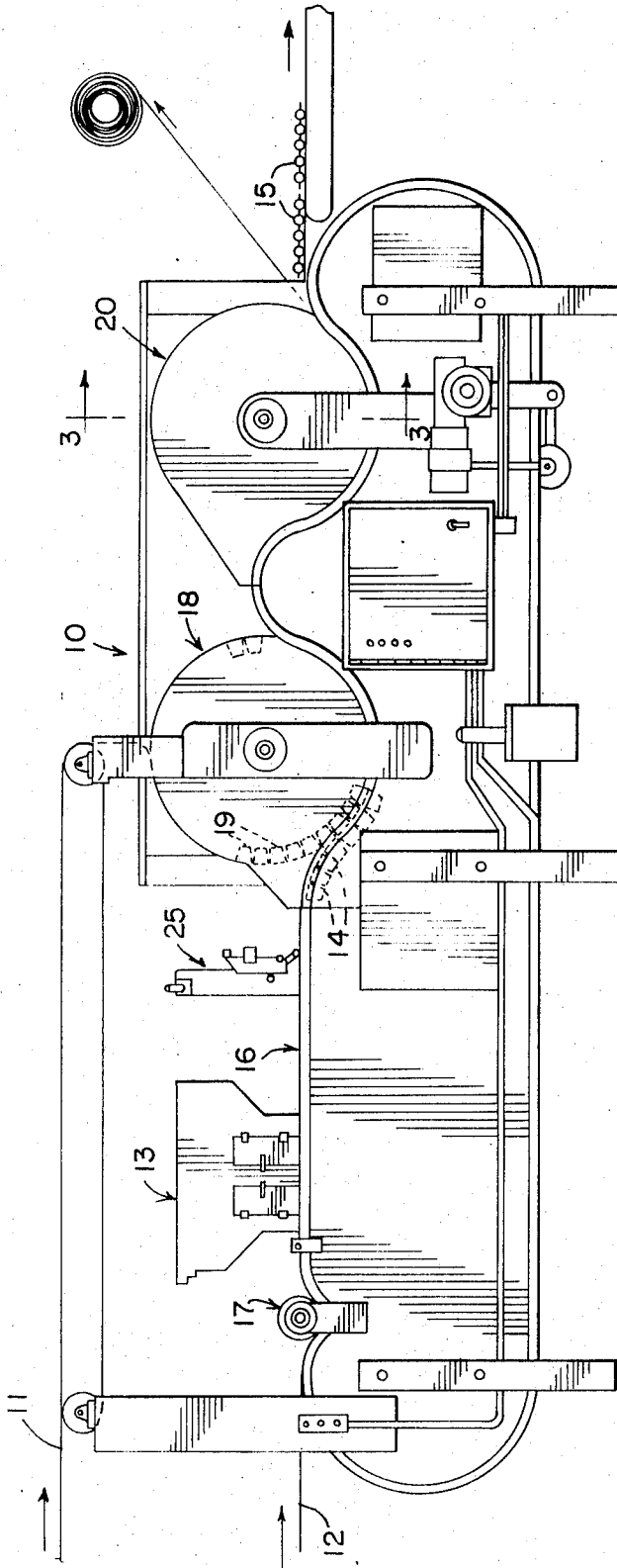


FIG. 1 -

FIG. 2 -

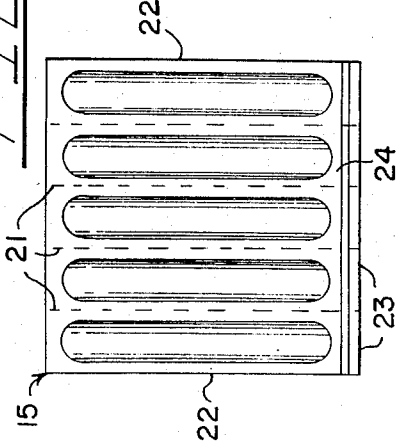
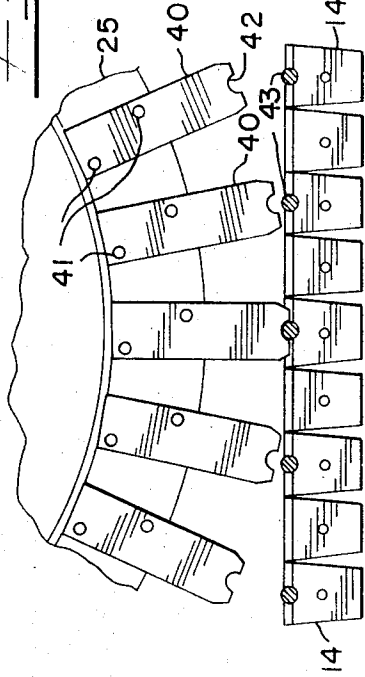


FIG. 6 -



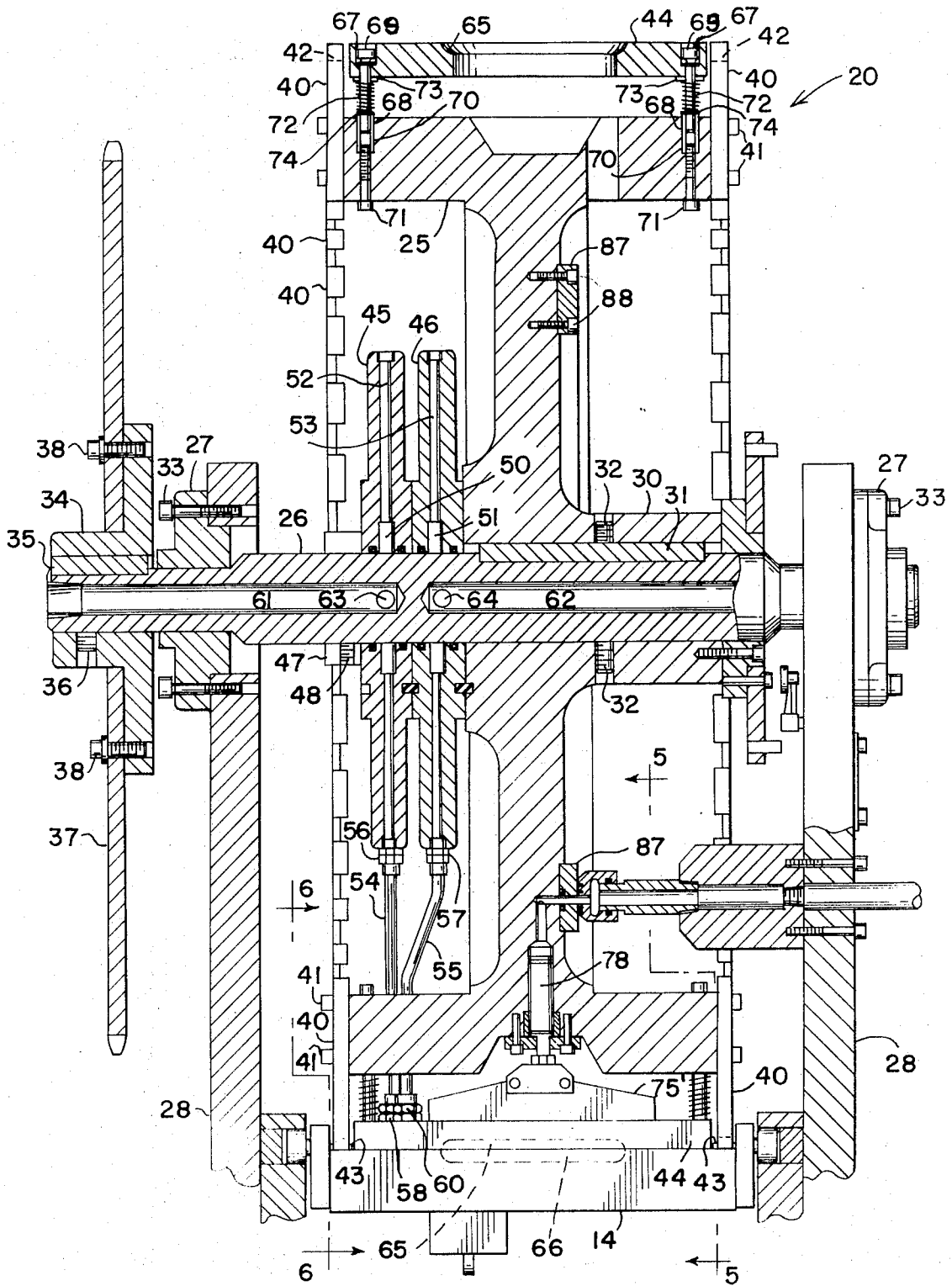
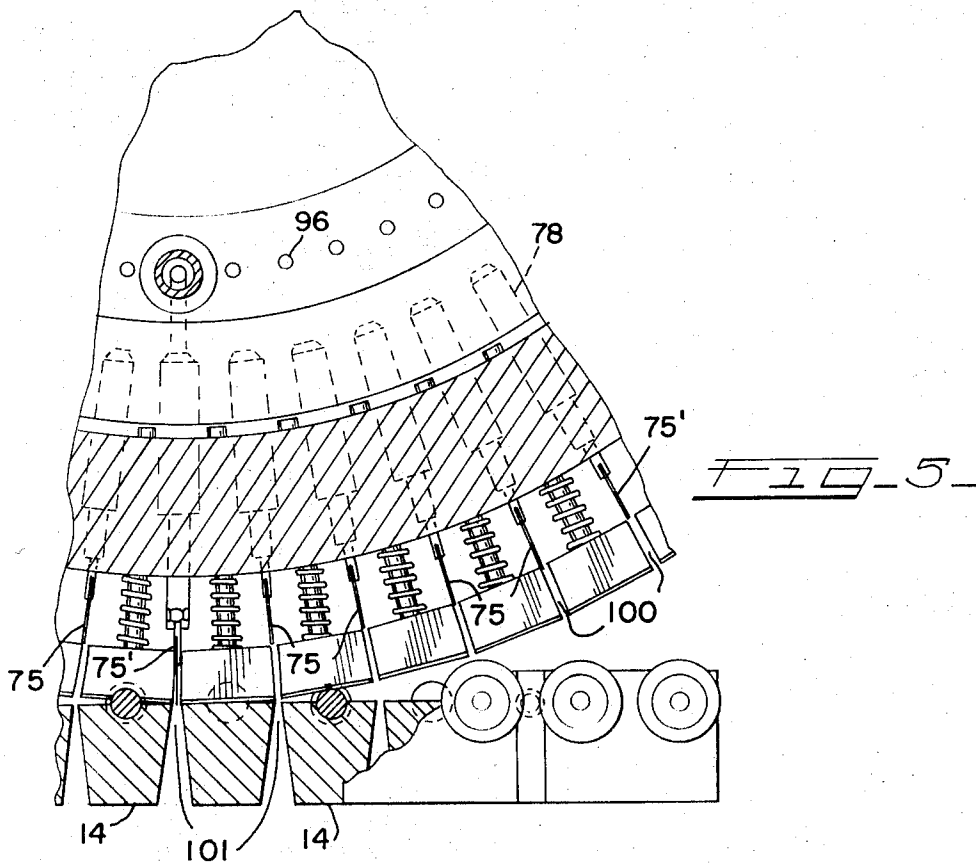
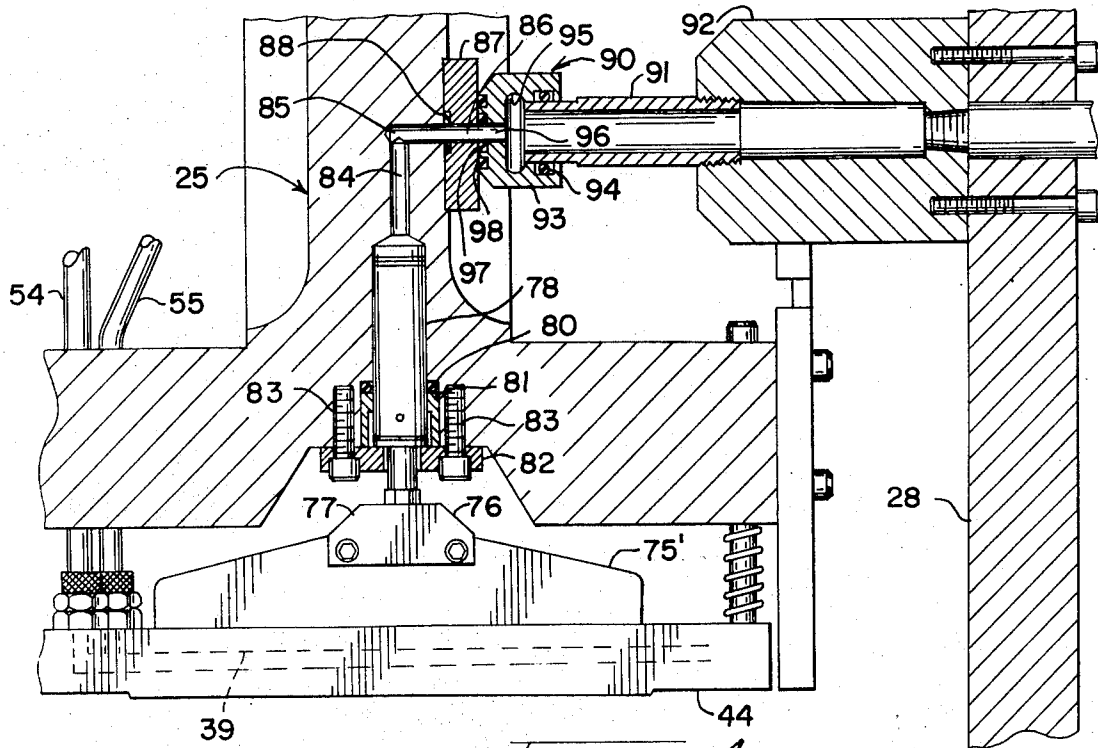


FIG. 3



PACKAGE CUT-OUT APPARATUS

The present invention relates generally to innovations and improvements in packaging elongated articles of uniform size and shape, particularly, small sausages such as wieners and smokie links, in spaced parallel relationship between sealable packaging films so that the articles can be consumed one by one without having to leave one or more unused articles in unsealed condition.

Apparatus and methods have heretofore been provided for packaging groups of elongated articles of uniform size and shape such as wieners and smokie links, in side-by-side touching relationship in evacuated, hermetically sealed skin-tight envelopes formed from upper and lower webs of packaging film having excellent oxygen and moisture barrier properties. Apparatus and methods of this general character for packaging wieners, smokie links and the like in groups are disclosed in U.S. Pat. Nos. 3,083,106; 3,129,545; 3,147,587; 3,189,505; and 3,195,288.

While in the above-mentioned patents the upper and lower webs of packaging films utilized include laminates of saran film initially in the super-cooled or amorphous condition and such films are also used to advantage in practicing the present invention, it will be appreciated that the apparatus and method of the present invention are not limited to the use of packaging films formed of saran or laminates of saran in the super-cooled or amorphous condition but are applicable to other packaging films which can be readily sealed around the articles to be packaged.

Heretofore, as disclosed in the above-identified patents, small sausages such as wieners and smokie links have been packaged in flat, side-by-side groups of five, for example, between upper and lower webs of packaging film which by use of the apparatus and method of the above-mentioned patents form evacuated, hermetically sealed envelopes or packages tightly fitting or conforming to such groups of small sausages. While such prior packaged groups of small sausages have been adapted to be partially opened in such manner that individual sausage can be removed therefrom one at a time if desired, nevertheless, once the hermetic seal is broken in order to remove a single sausage the remaining sausages no longer have the protection that the hermetically sealed envelopes originally afforded.

Accordingly, there has been a requirement for apparatus and method whereby single sausages such as wieners and smokie links could be economically sealed in individual hermetically sealed envelopes formed of packaging film exhibiting adequate oxygen and moisture barrier properties. The apparatus and method of packaging disclosed in the above-mentioned patents include means and steps of separating or removing hermetically sealed packages of wieners and smokie links from the combined, continuous upper and lower films utilized in forming the packages. While the same general apparatus and method could also be adapted for removing separate packages of single wieners or sausages, merchandising requirements call for separating or removing the individually or singly packaged sausages in predetermined groups, e.g. five with the individual articles or sausages in such groups being readily separable one from another so that the consumer can remove them and use them one at a time.

The object of the present invention, generally stated, is the provision of an apparatus and method for receiving elongated articles of uniform size and shape, such as wieners or smokie links, which have been individually packaged in separate hermetically sealed envelopes formed in parallel spaced relationship between sealable upper and lower webs of packaging film and then functioning or operating to both separate or sever such articles in groups of predetermined number, e.g. five, from such sealed webs and to also partially separate the individual envelopes or packages within each group so as to leave them interconnected along lines of perforations permitting ready detachment or separation one from another.

A more specific object of the invention is the provision of apparatus and method of the type described which may be located over the discharge end of the upper run of an endless chain of lower single-cavity die blocks and which apparatus and method efficiently utilize compressed air to sequentially actuate a series of projectable-retractable severing and perforating knives.

Certain other objects of a more detailed and specific nature will be apparent from the following description of a preferred embodiment of the invention.

For a more complete understanding of the nature and scope of the invention reference may now be had to the following description thereof taken in connection with the accompanying drawings, wherein:

FIG. 1 is a side elevational view of packaging apparatus for continuously forming hermetically sealed envelopes around individual wieners or smokie links by combining upper and lower webs of packaging film with an embodiment of the present invention forming one of the functional units of the apparatus and operating to separate the individually packaged wieners or smokie links in small groups from within which individual envelopes or packages of single wieners or sausages may be readily separated;

FIG. 2 is a plan view of a group of five wieners or smokie links individually packaged on the apparatus of FIG. 1 in hermetically sealed evacuated film envelopes with each being readily detachable from one another;

FIG. 3 is a vertical sectional view on enlarged scale taken on line 3—3 of FIG. 1;

FIG. 4 is an enlarged fragmentary sectional view of a portion of FIG. 3;

FIG. 5 is an enlarged fragmentary view partly in section and partly in side elevation taken on line 5—5 of FIG. 3; and,

FIG. 6 is a fragmentary side elevational view taken on line 6—6 of FIG. 3.

Referring to FIG. 1, a packaging machine in its entirety is indicated generally at 10, being supplied from the left hand end with an upper web of packaging film 11 and a lower web 12 and being further supplied with individual wieners from a supply feeder of known type indicated generally at 13, the feeder 13 operates automatically to discharge wieners onto a series of single-cavity lower die blocks 14—14 (FIGS. 3 and 5) interconnected in an endless chain with the upper run thereof passing or travelling from the left end of the machine to the right discharge underneath the feeder 13 and certain other units.

The machine 10 operates to individually package wieners in hermetically sealed individual envelopes

formed from the upper and lower films 11 and 12 and to discharge the individually packaged wieners in groups of five indicated at 15.

The packaging films 11 and 12 may comprise laminates of polyvinylidene chloride co-polymer (i.e. saran) in the super-cooled (i.e. amorphous) condition as described, for example, in the above-mentioned Pat. No. 3,189,505. Alternatively, the films 11 and 12 can be formed of other materials that can be rendered sufficiently formable on heating so as to envelope the individual wieners and then be sealed on the machine 10.

The support for the upper run of the chain of interconnected lower die blocks 14—14 is indicated generally at 16 in FIG. 1. In addition to passing underneath the wiener feeder 13 the lower die blocks or plates 14 also pass under a lower film press and suck-down unit indicated generally at 17, a package-forming, evacuating and sealing unit indicated generally at 18, and a package perforating and cut-out unit indicated generally at 20. The lower film press and suckdown unit 17 may, for example, have the construction shown and described in co-pending application Ser. No. 370,394 filed June 15, 1973 and assigned to the assignee of the present invention and application.

On passing through the package-forming unit 18 the upper web 11 of packaging film is sucked into the single die cavities in a series of upper die blocks 19 which mate sequentially with the lower die blocks 14 previously loaded with wieners or smokie links, so as to form individual evacuated and hermetically sealed packages or envelopes around each individual wiener. On leaving the unit 18 the individually packaged wieners still carried on the lower die blocks 14 and now included in the combined webs 11 and 12 pass into the package perforating and cut-out unit 20 which forms one specific embodiment of the present invention. In passing through the unit 20 the combined layers of film material interconnecting individually sealed wieners are perforated along lines 21—21 (FIG. 2) except where the film is completely cut through to separate the individual packages 15—15 along the side edges indicated at 22—22.

Since the lower film press and suck-down unit 17, wiener feeder and loader units 13 and package-forming unit 18 do not form a part of the present invention, they will not be specifically described. However, in general, these units of the apparatus 10 may conform to the corresponding units of the packaging apparatus described and shown in the abovementioned patents except that in the apparatus or machine 10 these units operate with single-cavity upper and lower die blocks or plates rather than multiple-cavity die plates and blocks.

In FIG. 2 one of the groups 15 of five package wieners or smokie links is shown with the sausages being individually packaged in evacuated and hermetically sealed envelopes 23—23, which are readily detachable from one another along the lines of perforations or scoring 21—21. If desired a tear strip 24 may be incorporated in known manner along one edge of the package 15 between the upper and lower films 11 and 12 so as to facilitate the opening of each individual envelope 23. The tape 24 when used is dispensed from a mechanism of known type indicated generally at 25 in FIG. 1.

Referring to FIGS. 3—6, for a detailed description of the construction and operation of the package cut-out

and perforating unit 20, it comprises a wheel 25 mounted for rotation on a shaft 26 journaled adjacent opposite ends in bearings 27—27 mounted on upright supports 28—28. The shaft 26 and hub 30 of the wheel 25 are provided with key-ways for receiving therein a key 31. A pair of set screws 32—32 assist in locking the wheel 25 on the shaft 26 for rotation therewith.

Each of the bearings 27 is secured to the upper end of its adjacent support 28 by a set of cap screws 33—33. Exteriorly of the left hand bearing 27 (FIG. 3) a sprocket hub 34 is secured to the projecting end of the shaft 26 by a key 35 and set screw 36. The sprocket hub 34 supports a sprocket 37 which is secured in place by a plurality of cap screws 38—38. The sprocket 37 is driven by a chain (not shown) which serves to drive the wheel 27 in timed relation with the other moving parts of the machine 10.

In order to transmit driving force to the upper run of lower die blocks 14 and thereby assist in the driving thereof, sets of radially oriented driver lugs 40—40 (FIGS. 3 and 6) are secured on opposite sides of the rim portion of the wheel 25 by pairs of cap screws 41—41. Each of the lugs 40 is provided with a semi-circular notch 42 in its distal end so as to have sequential mating engagement with the upper exposed portion of hardened drive pins 43—43 carried on the projecting ends of alternate lower die blocks 14. Accordingly, with the wheel 25 having, for example, 60 upper heater die blocks 44—44 mounted around the rim as will be described, there will be 30 lugs 40 in each set thereof.

Inwardly of the left hand set of driver lugs 40 (FIG. 3) a pair of heating fluid distributor discs 45 and 46 are mounted on the shaft 26 and secured in place thereon between the adjacent side of the hub of wheel 25 and a retaining collar 47 secured in place by set screw 48. Each of the distributor discs 45 and 46 has a plurality of radial passageways extending outwardly from central annular chambers 50 and 51, respectively, at the centers thereof. The radial passageways are indicated at 52—52 and 53—53, respectively, and correspond in number to the number of heater die blocks 44. The outer end of each of the radial passageways 52 and 53, respectively, is interconnected by means of a tube 54 and 55 to each of the heater die blocks 44. Suitable fittings 56 and 57 secure the inner ends of the tubes 54 and 55, respectively. Sets of fittings 58 and 60 connect the outer ends of each pair of tubes 54 and 55, respectively, to the heater die blocks 44. Each die block may have hair pin shaped passageway 39 (FIG. 4) to allow heating fluid to flow along one side and return along the opposite side.

The heater die blocks 44 are provided with fluid circulating passageways so that heating fluid (e.g. hot water) introduced or delivered to a heater block 44 through one of the tubular connections 54 or 55 can circulate through the heater die block 44 and then discharge through the other of the tubular connections 54 or 55.

The shaft 26 is drilled inwardly from opposite ends so as to provide passageways 61 and 62 the inner ends of which do not meet and communicate with the ports 63 and 64, respectively, which lead to the annular chambers 50 and 51, respectively.

Each of the heater die blocks 44 is formed with a longitudinally extending central die cavity 65 for mating with a die cavity 66 (FIG. 3) in the upper face of a

lower die block member 14. Each of the upper heater die blocks 44 is supported from adjacent its opposite end by means of shouldered retaining screws 69 extending through counterbored transverse holes 67 with the inner ends thereof screwed into spacer nuts 68—68.

The internally thread spacer nuts 68 are disposed in counterbored holes 70—70 in opposite sides of the rim of the wheel 25. The counterbored openings 70 also accommodate from the inside of the wheel cap screws 71—71 threaded into the inner ends of the spacer nuts 68. Each of the shouldered screws 69—69 is provided with a compressed coil spring 72—72 with the outer end of each bearing against a washer 73 and the inner end bearing against a washer 74, thereby resiliently biasing each of the heater die blocks 44 in an outward position.

As the wheel 25 rotates and each heater die block 44 passes through its nadir (FIG. 5) it mates with the upper surface of one of the lower die blocks 14 supporting one of the individual sealed package envelopes 23. The heat transmitted to the film serves to crystalize the same in the case of super-cooled saran films or laminates thereby rendering the same easily handleable without adhering to itself or to the other surfaces. The compression springs 72 permit each of the heater blocks 44 to yield inwardly as necessary during the mating engagement with the upper surface of a lower die block 14.

Outwardly projectable and inwardly retractable cutting and perforating blades 75' and 75 are disposed in the radial spaces 100 between the heater die blocks 44 on the exterior of the rim of the wheel 25 (FIG. 5). The blades 75'—75' are cut-through blades with continuous cutting edges at their extremities whereas the blades 75 are perforating blades having perforating cutting edges at the extremities.

Each of the knives 75 or 75' is supported at the upper middle portion thereof by a clamp 76 attached to the outer end of the piston rod 77 of an actuating air cylinder 78 of known commercial type. On actuation, air under pressure is admitted to the upper end of the cylinder 78 and serves to extend the piston rod 77 and attached blade 75 or 75'. When the air pressure is relieved, a compressed spring within the cylinder 78 serves to retract the piston rod and blade.

Each air cylinder 78 is received within a radially extending counterbore in the wheel structure 25 with an O-ring 80 seated in the bottom of the counterbore and on which is seated a sleeve 81 which is retained in place together with the air cylinder 78 by a bracket 82 held in place by a pair of cap screws 83—83.

The single air inlet and exhaust port into the upper end of each single acting cylinder 78 communicates with a radially extending passageway 84 in the wheel structure 25 which in turn communicates with a transversely extending passageway 85 registering with a transverse opening 86 in an air ring 87 concentrically mounted on the side of the wheel 25 by means of circumferentially spaced cap screws 88—88. The juncture between each passageway 85 and opening 86 is sealed by an O-ring 88.

For the purpose of sequentially introducing or admitting air under pressure to the air cylinders 78 as each knife or blade 75' or 75 passes through its nadir position, an air valve assembly indicated generally at 90, is telescopically mounted on the end of a nipple 91 ex-

tending from a fitting 92 carried on the inner side of the right hand upright support 28. Communicating passageways extending through the upright 28, fitting 92 and nipple 91 connect the air valve assembly 90 to any suitable source of air under pressure.

The air valve assembly 90 comprises a cup-like fitting 93 slidably mounted on the end of the nipple 91 with the sliding fit being sealed by an O-ring 94 retained in a circumferential groove on the interior of the fitting 93. The interior of the collar 93 is also provided with a circumferential chamber 95 from which a centered port 96 extends for registration with each of the openings 86 as the latter passes through their nadir position during rotation of the wheel 25. A pair of Teflon sealing rings 97 and 98 are retained in the outer end or face of the fitting 93 which bears against the outer side of the air ring 87.

Air pressure introduced into the air valve assembly 90 through the nipple 96 acts against the inner surfaces of the chamber 95. Since the vertical wall thereof adjacent the port 96 has greater area than the relatively narrow opposing wall of the chamber, a differential in force is created acting to continuously press the fitting 93 against the face of the air ring 87. The concentric Teflon rings 97 and 98 provide a low-drag sliding sealed fit between the outer face of the air valve fitting 93 and the rotating air ring 87.

In operation, it will be seen that each time one of the transverse ports or passageways 86 circumferentially located around the air ring 87 registers with the port 96 in the air valve assembly 90, air under pressure is admitted to the upper end of the associated air cylinder 78 actuating it to rapidly project the severing or perforating blades 75' or 75 outwardly through the radial space 100 (FIG. 5) between two adjacent heater die blocks 44 and into the radially aligned space 101 between a pair of the lower die blocks 14—14. The result of this action is to either completely sever or perforate, as the case may be, the sealed layers 11 and 12 of film intermediate adjacent wieners along the cut-off lines 22 or lines of perforations 21 (FIG. 2).

As soon as each port 86 passes through its nadir and leaves the air valve assembly 90, it will be seen that it is opened to the atmosphere so as to vent the associated air cylinder 78 and allow the piston therein to be retracted so as to simultaneously withdraw or retract the cut-off or perforating blade 75' or 75, respectively, to its withdrawn position as shown in FIG. 5.

It will be apparent that a number of changes or modifications of a detailed or design nature may be made in the package perforating and cut-out unit 20 without departing from the spirit and scope of the invention as defined in the appended claims. For example, while an air valve ring 87 formed of steel performs satisfactorily, the ring could be formed of other materials such as brass or bronze. Instead of heating the die blocks 44 by circulating heating fluid therethrough these may be heated electrically such as by insertion of Kelrod or equivalent known electrical heating elements. Instead of having two separate heating fluid distributor discs 45 and 46 these could be combined into a single disc. It will also be apparent that the packages arriving at the package cut-out and perforating unit 20 can be formed in any suitable apparatus.

What is claimed as new is:

1. In apparatus for individually packaging elongated articles in sealed parallel spaced relation between

upper and lower continuous webs of sealable packaging film including an endless chain of parallel lower die blocks each having a die cavity therein for supporting said lower web and receiving the lower portion of an article to be packaged, said endless chain having an upper run on which the packaging operations are performed, means for supplying said elongated articles to said lower web, and means for sealing said upper web to said lower web, the improvement comprising: means for completely or partially severing each or selected ones of said sealed articles from an adjacent sealed article on at least one side thereof, including a support wheel; means mounting said wheel over said upper run of lower die blocks for rotation on a horizontal axis parallel to said lower die blocks and transversely to the direction of movement thereof; a plurality of upper die blocks mounted on the rim of said support wheel for sequential mating engagement with said lower die blocks; a plurality of knives mounted for sequential projection into radially aligned spaces between said lower die blocks; and, actuating means for said knives, said actuating means comprising, a plurality of air cylinders radially mounted within the rim portion of said support wheel with the outer end of the piston rod of each air cylinder being supportingly connected to one of said knives, a valve ring concentrically located on one side of said support wheel and having circumferentially spaced transverse openings therein corresponding in number and spacing to said cylinders, said support wheel having internal passageways interconnecting each of said transverse air ring openings with one of said air cylinders, and air valve means mounted to register in pressure communicating relationship with each of said transverse air ring openings as its associated air cylinder and knife registers with the space between adjacent lower die blocks thereby actuating said associated air cylinder and knife to sever or perforate the packaging film interconnecting adjacent packages along a line registering with the space between a pair of adjacent lower die blocks.

2. In the apparatus of claim 1 said knives including knives with continuous cutting edges for completely severing the packaging film interconnecting adjacent packages and thereby detaching adjacent packages from each other and knives with discontinuous cutting edges for perforating the packaging film interconnecting adjacent packages thereby rendering adjacent packages readily detachable from each other, and each

pair of said knives with said continuous cutting edges having disposed therebetween a plurality of knives with said discontinuous cutting edges.

3. In the apparatus of claim 1 said upper die blocks being provided with heater means. equal

4. In the apparatus of claim 1 each of said upper die blocks having a passageway therein with inlet and outlet ports whereby heating fluid may be circulated there-through, said means for mounting said support wheel being a shaft with non-connecting passageways extending inwardly therein from opposite ends, fluid transmitting disc means mounted on said shaft having a pair of central chambers from each of which a set of passageways equal in number to said upper die blocks extend to ports in the periphery of said disc means, a conduit connecting one of said ports of each upper die block with a port in one of said sets of ports and another conduit connecting the remaining one of said ports of each upper die block with a port in the remaining one of said sets of ports, said shaft having one inner port communicating between one of said inwardly extending passageways therein and one of said central chambers and having a second inner port communicating between the remaining one of said inwardly extending passageways therein and the remaining one of said central chambers.

5. In the apparatus as called for in claim 4 said fluid transmitting disc means consisting of a pair of separate discs with each disc having one of said central chambers and one of said sets of passageways.

6. In the apparatus of claim 1 said valve ring comprising a separate ring member mounted on said support wheel.

7. In the apparatus of claim 1 said air valve means comprising a stationary nipple, a cup member telescopically mounted on said nipple with a port which sequentially registers with said openings in said valve ring.

8. In the apparatus as called for in claim 7 said cup including a chamber with differential areas arranged so that said cup is normally urged in the direction of said valve ring.

9. In the apparatus as called for in claim 7, said cup member having a vertical surface juxtaposed to the outer vertical surface of said valve ring and having at least one circular sealing element of low-coefficient of friction mounted in said vertical surface for sliding sealing engagement with said outer vertical surface.

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