Sept. 29, 1959 J. D. CONTI 2,906,843

AUTOMATIC THERMO PERFORATOR

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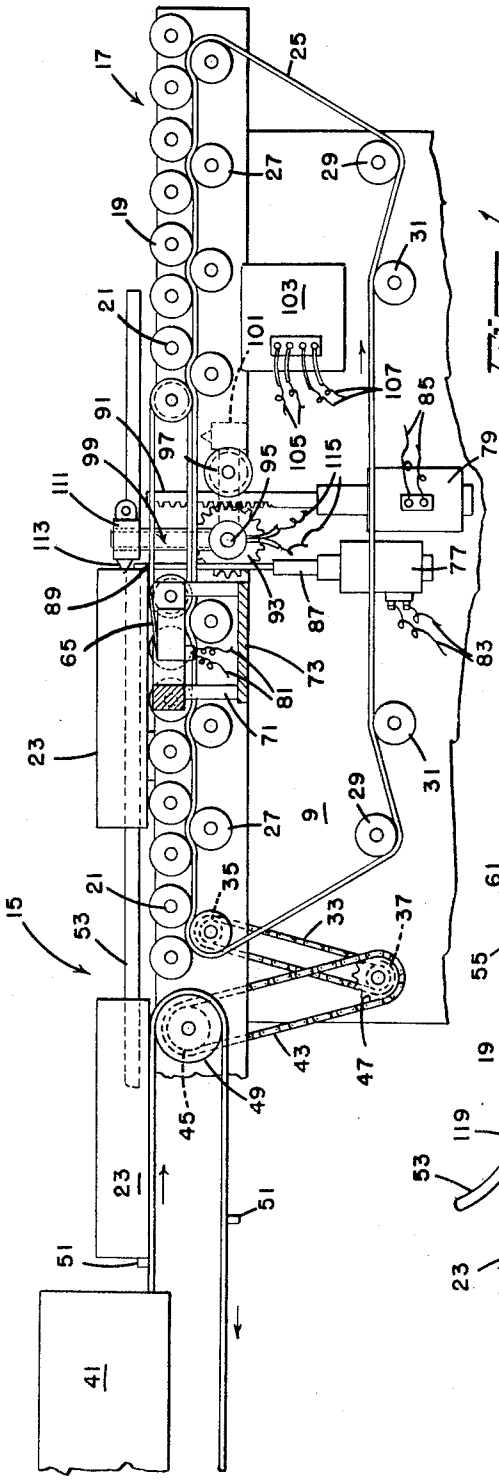

FIG - 1

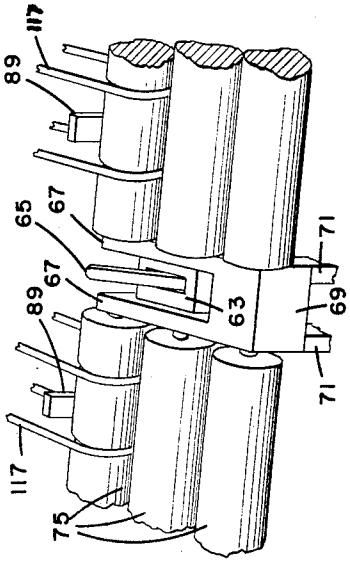

FIG - 3

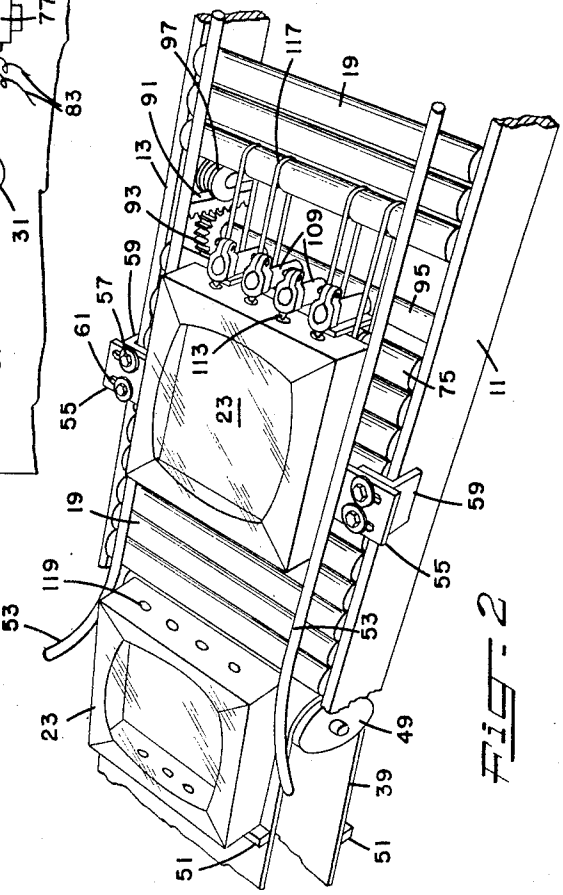

FIG - 2

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AUTOMATIC THERMO PERFORATOR

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The invention relates to article perforating, and particularly to the perforating of the overwrapping material of wrapped packages.

In packaging items of fresh food, it is essential that the package itself be properly ventilated to assure that no damage or deterioration to either the appearance or quality of the food results. With the conventional and current packaging procedures, fragile food articles, as for example baked goods, are placed in rigid containers which are then covered with a perforated wrapping material. The equipment employed in these known processes are designed to perforate the overwrapping material while it still remains in a web form, that is before being applied to a container, by utilizing a cutting knife and anvil or a rotary needle punch. In applications where proper article ventilation must be assured, the equipment now in use has not been entirely satisfactory since it is often difficult to obtain alignment of the perforations in the overwrapping material with those of the rigid container, and to maintain the perforation alignment once the container has been wrapped. It is therefore a primary object of this invention to provide a generally improved and more satisfactory perforating apparatus.

Another object is the provision of an apparatus for perforating a package overwrapping material after the overwrapping material itself has been applied to the package.

Still another object is to provide an apparatus wherein the wrapped packages are automatically and sequentially delivered to a perforating station, subjected to a multiple unit thermal perforating device for a specified time interval to effect perforation of the overwrapping material, and ultimately and automatically delivered to a package collection station.

A further object is the provision of a multiple unit thermal perforating device which is adapted to burn openings in an overwrapping material at selected points which are aligned with openings formed in the package container itself, and is automatically actuated into operative position by the package movement.

A still further object is the provision of a thermal perforating apparatus which is simple in construction and use, is adapted for relatively high speed operations with various sized packages, and is capable of effecting its various operations with a minimum of manual supervision and a maximum of efficiency.

These and other objects and advantages of the invention will be apparent from the following description and accompanying drawing in which:

Figure 1 is a side view of the perforating apparatus of the present invention with the thermal perforating device in operative position;

Figure 2 is a perspective view of a portion of the apparatus more clearly illustrating the operation of the thermal perforating unit; and

Figure 3 is a fragmentary perspective view showing the microswitch arrangement which initiates operation of the perforating unit.

In general, the invention relates to an apparatus which

is adapted to receive and convey wrapped packages to a thermal perforating unit where the package overwrapping material is apertured, after which the packages are delivered to a collection station. The movement of the package itself toward the perforating unit activates a microswitch mechanism which effects movement of the thermal perforating device into an operative position in the path of the package. A timer controls the duration in which the perforating unit remains in its operative position and initiates means for removing the same from the path of the package, which is then automatically carried into the collection station.

With reference to the drawings, the apparatus includes a supporting structure or framework which may be of any suitable construction and which is generally indicated by the character **9**. On the upper portion of the framework **9** are suitably fixed a pair of side or trunnion plates **11** and **13** which are disposed in spaced and substantially parallel relationship and extend the length of the apparatus, from a package receiving station to a package collection station indicated at **15** and **17**, respectively. A plurality of package engaging and propelling rollers **19**, having trunnions **21**, are disposed between the side plates **11** and **13**, with their trunnions being rotatably received within suitable openings in the side plates. As more fully explained hereinafter, the packages **23**, once wrapped, are frictionally engaged by the rollers **19** and thus a rubber coating or sleeve may be applied to the peripheries of the rollers or they may be roughened or knurled to improve the traction between the rollers and the package bottom wall.

Rotary movement is imparted to the rollers **19** by at least one endless belt **25**, with a pair of laterally spaced belts **25** being preferred. The belt **25**, as shown in Figure 1, is trained over a plurality of pulleys **27** and between pulleys **29** and **31**, with at least one of the last-mentioned pulleys being adjustably mounted to permit variations in the belt tension, as desired. A chain **33**, passing over a sprocket **35** carried on the same shaft as one of the belt supporting pulleys, such as the leftmost pulley **27** shown in Figure 1, is driven by a sprocket **37** which in turn is connected to a suitable motor, not shown, to provide the belt with a uniform and constant movement. It will be noted that the belt **25** does not travel along a horizontal plane tangent to the rollers **19** but is disposed to engage a peripheral segment of certain of the rollers **19** so as to insure good driving traction between the belt **25** and the surfaces of the rollers **19**.

As shown in Figure 1, the packages **23** are delivered to the rollers **19** by an endless conveyor belt **39** after the packages have been wrapped with a suitable material, such as cellophane, by any conventional apparatus generally indicated at **41**. The belt **39** travels in the direction shown by the arrows in Figure 1 and is driven by a chain **43** trained over sprockets **45** and **47**, the former of which is fixed to the same shaft as a conveyor belt roll **49**, while the latter is rotated by a suitable motor, not shown. Sequential delivery of the wrapped packages **23** at spaced intervals is insured by ribs **51** which are fixed to the belt **39** and are adapted to engage the packages as they leave the wrapping apparatus.

Once delivered to the perforating apparatus, the wrapped packages ride between guide rods **53** which, as seen in Figure 2 are arched away from each other at their left end to provide an enlarged entrance opening. The rods **53** are secured by plates **55** and bolts **57** to angle brackets **59** fixed to the side plates **11** and **13**, with the plates **55** having elongated bolt receiving slots **61** which allow lateral adjustment of the guide rods **53** and thus enable the apparatus to accommodate packages of various sizes.

As heretofore mentioned, the package movement along its guided path is relied upon to effect actuation of the

thermal perforating unit into an operative position. This function is accomplished by means of a conventional microswitch, indicated at 63, supported in advance of the perforating unit, with its resiliently urged contact lever 65 extending into the package path and being inclined in the direction of package travel. As best seen in Figures 1 and 3, the microswitch 63 is fixed between arms 67 of a bifurcated block 69, which in turn is supported from framework 9 or side plates 11 and 13 by brackets 71 and a plate 73. Since the block 69 occupies the central area of the package path immediately in advance of the perforating unit, rollers 75, rotatably mounted between the block 69 and the respective side plates 11 and 13, are employed as shown in Figure 3 to insure that the packages are subjected to a continuous and uniform propelling force. The rollers 75 are driven by the endless belt 25, as shown in Figure 1, in the same manner as the rollers 19 heretofore described.

The movement of a wrapped package over the microswitch 63 causes the lever 65 to be depressed thus closing the switch and causing solenoids 77 and 79 to be energized through suitable electrical connections shown at 81, 83, and 85. Once energized, the solenoid 77 elevates a plunger 87 so as to position laterally spaced stops 89 carried thereby in the path of the package to arrest its travel. Concomitantly, and preferably slightly in delayed relationship, the solenoid 79 elevates a gear rack 91 which engages with a pinion gear 93 and rotates both the gear 93 and a shaft 95 to which the gear is fixed. A grooved roller 97 may be employed to guide the rack 91 along its vertical path. The rotation of the shaft 95 thus swings thermal perforating elements 99 as a unit from an inoperative position below the package path, as illustrated by the broken line 101, to an operative position as shown by solid lines in Figure 1.

The duration of time in which the stops 89 and the thermal perforating unit remain in their elevated or operative position is controlled by a timer mechanism 103 which is of conventional construction and which is electrically connected with the solenoids 77 and 79 and microswitch 63 through wires 105 and 107. While the movement of the package arresting stops and thermal perforating unit have been described as being actuated by individual and separate solenoids, it is of course obvious that a single solenoid may be utilized to effect operations of both elements without departing from the spirit or scope of the invention. In this last mentioned manner, the number of teeth on the pinion gear and rack for moving the shaft 95 can be selected so as to have the stops elevate in advance of the thermal perforating unit and retract after the thermal unit has been moved below the package path.

The perforating elements 99 each include a support arm 109 extending substantially radially from the shaft 95, and a removable perforating head 111 having a conical punch or pin 113. A heating element is disposed within the arm 109 for heating its respective pin 113 and is supplied with electrical energy through wires 115 connected to a suitable source, not shown. It will be noted that the thermal elements 109 are disposed well below the package when in inoperative position and thus no danger of damaging the wrapping material or package exists. If desired, a perforated hood or guard may be placed over the perforating station of the apparatus to protect personnel yet allow the area to be well ventilated.

To convey the package over through the perforating station once the perforating has been completed, there is provided a plurality of endless belts 117 or the like which are passed about the rollers 19 and 75, as shown in Figure 2, so as to span the area within which the perforating elements 99 swing. Grooves are provided in the rollers 19 and 75 to restrain lateral movement of the members 117, to maintain the peripheral area of the rollers 19 and 75 substantially uniform and continuous, and to insure snug driving contact between the rollers and the members 117. To insure snug contact between the members 117 and rolls 19 and 75, the members 117 may be in the form of endless tension springs.

In operation, the article to be packaged is placed into the rigid container which is then passed into the wrapping apparatus 41. When packaging baked goods, such as pies, the rigid container is usually provided with ventilating openings as shown at 119 and the purpose of the structure of the present invention is primarily to perforate the overwrapping material at locations aligned with the container openings 119. The wrapping apparatus 41 applies the overwrapping material, such as cellophane, which is the form of a continuous web, with no special care or pre-perforating of the web being required as with the conventional packaging procedures heretofore described. Once wrapped, the conveyor belt 39 sequentially delivers the wrapped packages to the rollers 19 which propel the same toward the perforating unit.

Prior to reaching the perforating station, the package 23 passes over and depresses the microswitch lever 65 which in turn energizes the solenoid 77 and effects elevation of the stops 89. The package movement is thus arrested. The closing of the microswitch contacts also energizes the solenoid 79 which causes the rack 91 to rotate the gear 93 and shaft 95 to swing the perforating elements 99 from their position shown at 101 to their solid line position shown in Figure 1. The heated pins 113 thereby engage with the package overwrapping material and burn the same in the areas of the package openings 119, it being understood that the spacing of the pins 113 is the same as the spacing of the opening 119 in the rigid container. When cellophane is employed as the overwrapping material, the timer 103 allows the thermal perforating elements to remain in operative position for approximately three-tenths of a second, but it will be understood that this period of burning may be varied depending upon the type and thickness of the material employed and the size of the ventilating opening desired.

Once perforation of the overwrapping material is completed, the timer 103 causes the solenoids 77 and 79 to de-energize and allow the stops 89 and perforating unit to be retracted below the package path, with the perforating unit being retracted in advance of the stops. The package is then advanced toward the station 17 by the members 117 and rollers 19 and are there collected. If opposite sides of the package are desired to be provided with ventilating openings, it is merely necessary to pass the packages through the perforating apparatus with their unperforated side in advancing positioning.

From the above description, it will be noted that little supervision is required and that the wrapping material is provided with ventilating openings at the exact locations desired and in a minimum of time.

It is seen from the above description that the objects of the invention are well fulfilled by the apparatus described. The description is intended to be illustrative only and it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. Article perforating apparatus including means for moving an article along a path from a first station to a second station, stop means intermediate said first and second stations movable into an operative position into the article path for arresting the article movement as it travels toward said second station and into an inoperative position removed from the article path, perforating means movable into an operative position to engage with and perforate the article when said stop means are in operative position and into an inoperative position removed from the article path when said stop means are moved into an inoperative position, and means for moving said stop means and perforating means into said operative and inoperative positions.

2. An apparatus as defined in claim 1 wherein said

perforating means includes at least one heated pin for burning an opening in the article.

3. An apparatus as defined in claim 1 wherein said perforating means includes a rotatable shaft, at least one pin carried by said shaft and extending in a plane parallel to and spaced from the axis of rotation of said shaft, and means for heating said pin.

4. An apparatus as defined in claim 3 wherein said means for moving said perforating means into operative and inoperative positions includes a gear operatively connected with said shaft and a solenoid actuated rack operatively engaging with said gear.

5. Apparatus as defined in claim 1 wherein said last-mentioned means includes a timing device for moving said stop means and perforating means at predetermined intervals.

6. An apparatus as defined in claim 5 wherein said last-mentioned means further includes a switch disposed along the article path and operatively connected with said timing device, said switch being actuated by the movement of the article relative thereto.

7. Article perforating apparatus including a conveyor for moving individual articles along a path from a first station to a second station, stop means intermediate said first and second stations, means for moving said stop means into an operative position into said path to engage with and stop the movement of one of the articles and into an inoperative position removed from said path, article perforating means, means for moving said perforating means into an operative position to engage with the article and perforate the same and into an inoperative position removed from said path, and means for concomitantly actuating said means for moving said stop means and said perforating means.

8. An apparatus as defined in claim 7 wherein said conveyor includes a plurality of rolls disposed in aligned, spaced, and parallel relationship, an endless belt frictionally engaging with and driving said rolls, and means for moving said belt.

9. An apparatus as defined in claim 7 wherein said

perforating means includes a thermal unit for burning at least one opening in each of the articles.

10. Apparatus for perforating the overwrapping material of a wrapped package including means for conveying the package along a path from a first station to a second station, stop means intermediate said first and second stations, means for moving said stop means into an operative position into said path to engage with and stop the movement of the package and into an inoperative position removed from said path, a thermal perforating unit, means for moving said perforating unit into an operative position to engage with the package and burn at least one opening in the overwrapping material thereof and into an inoperative position removed from said path, and means for concomitantly actuating said means for moving said stop means and said perforating unit.

11. In an article packaging device, a thermal perforating unit including a shaft, at least one pin carried by said shaft and extending in a plane substantially parallel to and spaced from said shaft, means for heating said pin and means for rotating said shaft between operative and inoperative positions.

12. In an article packaging apparatus, a thermal perforating unit including a rotatable shaft, at least one pin carried by said shaft and extending in a plane substantially parallel to and spaced from said shaft, means for heating said pin, a gear carried by said shaft and a rack operatively engaging with said gear for rotating said shaft into operative and inoperative positions.

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