CUTOFF KNIFE FOR PACKAGING MACHINE
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6 Claims

ABSTRACT OF THE DISCLOSURE
A packaging machine having an elongated cutoff knife housed within one of a pair of oppositely disposed, rotatable sealing dies, and an actuating mechanism operative to intermittently move the knife through a continuous length of wrapping material between spaced-apart articles enclosed therein into a receiving slot on the other one of the sealing dies. The knife cuts through the wrapping material in a rapid, slicing motion when the sealing dies are in engagement with opposite sides of the wrapping material during a crimping and sealing operation, a trip member serving to initiate the actuation of the knife at the desired time.

BACKGROUND OF THE INVENTION
Packaging machines of the type in which articles to be wrapped are entwined in a continuous length of wrapping material have conventionally employed rotary sealing and cut-off dies which operate to seal and sever the wrapping material between adjacent articles. The use of rotary cutting dies which project radially outwardly beyond the crimping and sealing dies in the manner shown in U.S. Pat. No. 2,546,721, is disadvantageous in that the projecting cutting dies necessarily interfere with the substantially instantaneous sealing of the wrapper ends between the mating sealing dies. As the projecting cut-off dies rotate into contact with each other, they tend to hold the sealing dies apart, thereby reducing the pressure contact of the sealing dies necessary to effect proper sealing of the wrapper web.

Also, the fixed mounting of the cutoff dies on the opposed sealing dies substantially precludes the use of such combined sealing and cut-off dies in so-called "strip packaging" operations where a predetermined number of packaged articles are to be connected together by the wrapping web in a single strip. With the cutoff dies fixed to the ends of the sealing dies, there is no way that the cutting operation can be selectively controlled in such a way as to permit a predetermined number of packaged articles to pass between the sealing dies before the web is severed.

The cutoff knife arrangement of this invention has been designed with a view towards overcoming the aforesaid difficulties associated with prior art packaging machines.

BRIEF SUMMARY OF THE INVENTION
Having in mind the foregoing difficulties associated with prior art packaging machines, I have developed a new machine which is particularly characterized by a guillotine type of cutoff knife which provides a sharp, quick cutting action and which does not depend upon pressure for its operation. The cutoff knife is advantageously housed with a recess in one of the rotary sealing dies, and is movable therefrom into a complementary opening or slot in the other one of the sealing dies to accomplish the severing of the wrapping web. The knife is preferably in the form of an elongated, sharp-edged blade which is moved through the wrapping material in a guillotine-like severing motion by an operating mech-

anism when the crimping and sealing dies are in a predetermined position of alignment in engagement with the wrapping web.

A beneficial feature of my invention resides in the mounting of the cutoff knife within a recess in one of the sealing dies in such a way that the knife cutting edge does not normally project outwardly beyond the peripheral surface of the sealing die. There is thus no outwardly projecting cutoff member to interfere with the pressure contact between the mating sealing dies. This is especially important on a "strip packaging" operation wherein the wrapping web must be cramped and sealed between adjacent articles several times without severing the wrapping web.

In order to actuate the knife-operating mechanism, I utilize a strike or trip member which may take the form of a cam rotatably mounted on one of the sealing die shafts, however preferably a stationary member mounted on one of the spring-loaded bearing blocks within which the shaft supporting the sealing die holding the cutoff knife is rotatably supported.

My invention is further advantageously characterized by an embodiment wherein the trip member for the knife-operating mechanism is movable in and out of its operating position by a control arrangement which shifts the trip member into position to actuate the cutoff knife in response to the passage of a predetermined number of packaged articles between the sealing dies to facilitate a "strip packaging" operation.

These and other objects and advantages of my invention will become readily apparent as the following description is read in conjunction with the accompanying drawings wherein like reference numerals have been used to designate like elements throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS
FIG. 1 is a front, elevation view of a preferred embodiment of the packaging machine of this invention;
FIG. 2 is a side elevation view of the machine of FIG. 1;
FIG. 3 is a vertical section view taken along lines 3—3 of FIG. 1;
FIG. 4 is a partial end view taken along lines 4—4 of FIG. 1;
FIG. 5 is a fragmentary, rear elevation view of an alternative form of the cut-off mechanism of this invention;
FIG. 6 is a vertical section view taken along lines 6—6 of FIG. 5;
FIG. 7 is a vertical section view taken along lines 7—7 of FIG. 5;
FIG. 8 is a fragmentary, front elevation view showing a modified form of the web severing mechanism of this invention; and
FIG. 9 is a vertical section view taken along lines 9—9 of FIG. 8.

The packaging machine of which this invention forms a part conventionally includes conveyor means for propelling a continuous web of wrapping material over a forming die so as to shape the web in the form of an elongated tube within which articles fed in by a separate conveyor are enclosed in spaced apart relationship. These preliminary steps have not been illustrated as they form no part of this invention. The wrapping web with the entwined articles to be packaged, such as candy bars, is then conveyed to a sealing and cutoff station at which the ends of the wrapping material between adjacent articles are sealed together in spaced apart relationship incorporating the improved cutoff arrangement of my invention is indicated generally by reference numeral 1 in FIGS. 1 and 2. The assembly is supported on upright members 2 and 3 on which horizontal beams 4 and 5 are supported. Vertical frame members 6, 7, 8 and 9 (not
shown) extend upwardly from horizontal beams 4 and 5, and transverse bearing blocks 10, 12, 14, and 16 extend therebetween. Upper shaft 18, which is rotateably mounted between bearing blocks 10 and 12, supports a first crimping and sealing die 20. A mating crimping and sealing die 24 is fastened to lower, rotary shaft 22 supported between bearing blocks 24 and 26.

Rotary motion is imparted to shaft 22 by means of an epicyclic gear train having a main, eccentric drive gear 24 which is rigidly secured to shaft 26. Hub 28 serves to drivingly connect main power input shaft 30 to stub shaft 26 in such a manner that when input or drive gear 24 are disposed eccentrically with respect to rotary power shaft 30, thereby causing eccentric gear 24 to move in an orbit as shaft 30 rotates. Link 32 is rotateably supported by means of collar 33 on bearing 34 secured to stub shaft 26. The other end of link 32 is rotateably mounted on floating stub shaft 36 by means of bearing 38. A second gear 40 having its teeth enmeshed with the teeth of eccentric drive gear 24 is rotateably supported on floating stub shaft 36. The teeth of gear 40 are also in driving engagement with the teeth of gear 42 which is supported for rotational movement on stub shaft 44. Bearing 46 on shaft 44 pivotally supports a second link 49 which is connected at its outer or lower end to bearing 38 on shaft 36. As eccentric drive gear 24 orbits in the clockwise direction indicated by the arrow in FIG. 2, the number of its teeth meshing with the teeth on gear 40, and the point of mesh, constantly changes and, therefore, the angular velocity at which gear 40 is driven by gear 24 varies within each revolution of gear 24. Also, interconnecting link 32 causes gear 40 to oscillate back and forth as gear 42 orbits, and the relative angular disposition of links 32 and 49 will change from the acute angle shown in FIG. 1 to an obtuse angle when gear 24 is at the bottom of its orbit. As gear 24 orbits downwardly it drives gear 40 at an increasing angular speed due to the increase in the number of teeth meshing; and, as gear 40 orbits upwardly it drives gear 40 at a decreasing speed.

Since gear 40 is constantly enmeshed with gear 42, its changing angular velocity will be reflected in a corresponding constant change in the angular velocity of gear 42. As gear 40 moves to the left, it drives gear 40 at an increasing rotational speed because of the change in the point of mesh of the teeth of the two gears. Gear 49 will be rotating at an increasing or accelerated angular speed as it moves to the left because eccentric drive gear 24 is moving downwardly at that time; therefore, the angular speed of gear 49 will also be accelerating at this time. Correspondingly, as gear 40 moves to the right, it will drive gear 42 at a decreasing rotational speed.

The rotation of gear 42 by the aforesaid epicyclic gear train will result in the rotational movement of lower shaft 22 to which gear 42 is rigidly attached. Pinion gear 48 on shaft 22 will in turn drive enmeshed pinion 50, thereby causing the rotation of upper shaft 18 in a counterclockwise direction. By virtue of the above-described epicyclic gear drive arrangement, shafts 18 and 22 and dies 20 and 24 mounted thereon will rotate at constantly changing angular velocities. Crimping and sealing dies 20 and 24 are so located on shafts 18 and 22 that they will be rotating at a maximum speed when they are in the position shown in FIG. 1 directly opposite each other in face-to-face engagement with the wrapping web; and, they will then rotate to a crimping and sealing speed of below adjacent articles so that the ends of the separate packages may then be packaged may pass completely by them before they again engage the wrapping web.

As may be noted with respect to FIGS. 1 and 2, upper bearing blocks 10 and 12 are free to float or shift vertically and are urged downwardly towards lower, stationary bearing blocks 14 and 16 by means of tension springs 52 and 54. The purpose of springs 52 and 54 is to maintain the desired pressure on sealing die heads 20 and 24 so that they will engage the wrapping web with sufficient pressure as it passes between them to properly carry out the sealing and crimping of the wrapper between adjacent articles. The tension force exerted by springs 52 and 54 on floating bearing blocks 10 and 12 may be adjusted by turning adjusting screws 55 and 57 which bear against the top of the springs in the manner shown most clearly in FIG. 2. Adjusting screws 54 and 55 are housed within externally threadable, tubular member 56 and 58 which may be rotated by hand wheel 58 (FIG. 1) to effect the vertical adjustment of bearing blocks 10, 12, 14 and 16 on vertical frame members 6, 7, 8 and 9. For this purpose, there is provided a vertically shiftable frame assembly comprised of horizontally extending cross member 60 and downwardly depending legs, two of which are shown at 61 and 62 in FIG. 2. Cross member 60 is notched at its opposite ends to receive the inner edges of upright frame supports 6, 7, 8 and 9 along which the frame assembly comprised of cross member 60 and the downwardly depending legs 61 and 62 may slide up and down. Tubular adjusting arms 56 and 57 extend downwardly through cross member 60 in threaded engagement therewith. Sprockets 63 and 64 are mounted on adjusting stems 56 and 57 for rotation therewith, rotary movement being transmitted from sprocket 63 to sprocket 64 by interconnecting chain 65. Bearing blocks 10, 12, 14 and 16 may be releasably secured to the frame assembly legs 61, 62, 65 and 66 by fastening means (not shown) which permit the vertical adjustment of the bearing blocks together as a unitary assembly. This may be accomplished by turning hand wheel 58, which is firmly attached to the upper end of adjusting stem 57. The rotation of hand wheel 58 will revolve adjusting stem 57, which will in turn transmit rotary power to adjusting stem 56 by means of sprockets 63 and 64 and connecting chain 65. As adjusting stems 56 and 57 rotate, the bearing block adjusting assembly 60, 61, 62 will be displaced vertically by reason of the threaded attachment of cross member 60 to threaded stems 56 and 57. Thus, depending upon the direction of rotation of hand wheel 58, bearing blocks 10, 12, 14 and 16 will be carried upwardly or downwardly along upright frame supports 6, 7, 8 and 9 by frame assembly 60, 61, 62.

Upper, floating bearing blocks 10 and 12 may also be adjusted vertically relative to lower bearing blocks 14 and 16 by a threaded stud and adjusting nut arrangement which appears most clearly in FIG. 6. Stud 66 extends between bearing blocks 10 and 14 and 16 and connects cross members 18 and 20 in recesses therein, the upper end of stud 66 being secured to bearing block 10 to prevent the rotation of stud 66 as nut 65 is turned. Stud 66 is shiftable vertically within a recess in the top of lower bearing block 14. By rotating nut 68 either clockwise or counterclockwise stud 66 will be made to move up or down so as to thereby cause floating bearing block 10 to move towards or away from lower, stationary bearing block 14. This adjustment means may be utilized to precisely fix the spacing between crimping and sealing dies 20 and 24 for a particular wrapping web thickness.

As the wrapping web containing entubed articles passes between sealing and cut-off die heads 20 and 24, the opposite faces of the wrapping web 70 are cramped together and sealed between adjacent packaged articles by the rotation of sealing heads 20 and 24 into contact therewith in the manner indicated in FIG. 3. Ordinarily, it is necessary to cut wrapping web 70 between adjacent articles so that the ends of the separate packages may then be tacked and sealed against each package in a subsequent operation. For the purpose of carrying out this web-cutting operation, I have provided a unique arrangement utilizing an elongated cutoff knife 72. Referring now to FIGS. 1, 3 and 4, it will be seen that knife 72 is mounted transversely with respect to the path of movement of wrapping web 70 and is housed within a long, narrow slot 74 in upper sealing die 20. Knife 72 is movably supported for reciprocal movement in and out of slot 74 by links 76 and...
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which are pivotally secured to the opposite ends of die head 20 within recess 80. A coil spring 82 acting against collar 84 of knife handle 86 serves to bias operating links 76 and 78 towards the rest position shown in FIG. 1 wherein they hold knife 72 in its normal, retracted position within slot or recess 74 of die head 20. It is to be noted that in its rest position knife 72 is held in its entirety within slot or recess 74 so that its cutting edge does not project outwardly beyond the peripheral surface of sealing die 20. This arrangement insures that knife 72 will not interfere with the pressure contact between sealing and crimping dies 20 and 24, and is also important with respect to the proper carrying out of strip packaging operations hereinafter described. Knife operating links 76 and 78 are arranged to be pivoted in such a way as to carry knife 72 downwardly and laterally out of slot 74 through and across wrapping web 70. A complementary slot 88 is provided in the upper base of lower sealing die 24 to receive knife 72 as it passes downwardly through wrapping web 70. In addition to links 76 and 78, the operating mechanism for knife 72 includes a cam follower roller 90 attached to link 76. In order that knife 72 may be smoothly received into slot 88 in lower die head 24 without interfering with the sealing and crimping of the wrapping web moving between the two die heads, it is essential that the knife operating mechanism be actuated when die heads 20 and 24 have rotated into direct vertical alignment with each other in pressure contact with the opposite faces of wrapping web 70. In FIGS. 1 and 3, I have shown a preferred form of trip means for actuating the knife-operating mechanism comprising a stationary strike member 92 secured to a threaded pin 94. A lock nut 96 holds threaded pin 94 to mounting plate 98 which is attached to upper, floating bearing block 10. As may be noted most clearly with respect to FIG. 3, strike member 92 has a substantially oval configuration with triangular projections, the upper one of which is adapted to strike cam roller 90 as sealing dies 20 and 24 rotate downwardly and horizontally towards each other. The direction of rotation of shafts 18 and 22 is indicated by directional arrows in FIG. 3. Strike member 92 is offset slightly with respect to the vertically aligned position of dies heads 20 and 24 and is vertically oriented so that its upper, triangular projection 93 will contact cam roller 90 to actuate knife operating links 76 and 78 just before crimping and sealing heads 20 and 24 are in direct contact. In this manner, knife 72 is so timed for knife 72 to be fully displaced downwardly out of slot 74, sealing heads 20 and 24 will have rotated into vertical alignment in the position shown in FIG. 3 wherein they will crimp and seal wrapping web 70 therebetween. When cam roller 90 strikes projection 93 of strike member 92, it will be displaced upwardly, thereby causing link 76 to pivot to the phantom line position shown in FIG. 1. As link 76 pivots downwardly, it will pull knife 72 downwardly and laterally out of slot 74 against the pressure of spring 82. The movement of knife 72 out of slot 74 will cause link 78 to pivot to the vertical, phantom line position shown in FIG. 1. The triangular shape of projection 93 ensures that cam roller 90 will not dwell at the upper limit of its displacement path and will immediately return downwardly to its normal position of rest as it rotates past strike member 92 with die head 20. This very quick upward and downward movement of cam roller 90 insures that knife 72 will penetrate very rapidly through wrapping web 70 with a sharp, swift guillotine-type of cutting stroke which cleanly severs wrapping 70 without interfering with the sealing action between dies 20 and 24. After cam roller 90 passes strike member 92 spring 82 returns knife 72 to its position of rest within upper slot 74. The angular disposition of strike member 92 is so selected that knife 72 will be actuated at the precise instant when sealing dies 20 and 24 are directly opposite each other in sealing engagement with opposite faces of web 70. The initiation of the knife cutting action in this manner provides several advantages. First of all, it insures the positioning of knife 72 and complementary receiving slot 88 directly opposite each other so that as knife 72 penetrates through wrapping web 70, it will be cleanly received within slot 88 in lower sealing die 24. Also, the cutting action of knife 72 is improved by causing it to move through web 70 at the instant that the web is held tightly between sealing dies 20 and 24.

Knife 72 is preferably provided with a sharp, scalloped bottom edge to enhance its cutting action. Also, knife 72 and receiving slot 88 are so oriented on their respective sealing dies 20 and 24 that as knife 70 moves downwardly into slot 88 it will slide over back wall 89 thereof so as to provide a desirable shearing action. This disposition of knife 72 with respect to receiving slot 88 is best shown in FIG. 3.

It is noteworthy that there is a particular advantage derived from mounting knife trip member 92 on upper, floating bearing block 10. If trip member 90 were mounted on upright frame support 5 or otherwise not attached to one of the floating bearing blocks 10 or 12, the upward force exerted on roller 90 by strike member 94 could cause upper shaft 18 and its floating bearing blocks 10 and 12 to shift upwardly a slight distance against tension springs 52 and 53, thereby undesirably reducing the crimping and sealing pressure with which die head 20 contacts lower die head 24 and wrapping web 70 passing therebetween. Since strike member 92 is mounted on floating bearing block 10, there can be no relative vertical movement therewith as roller 90 strikes member 92. Thus, shaft 18 and upper die head 20 will not be displaced upwardly and the desired sealing pressure of the die heads 20 and 24 is maintained.

Provision has been made for the vertical and horizontal adjustment of strike member 92 to permit control of the depth of knife penetration as well as the initial point of knife activation. As may be noted with respect to FIGS. 1 and 2, strike member mounting plate 98 abuts against the lower face of bearing block 10 and is attached thereto by fasteners 100. Fasteners 100 extend through horizontal slots 102 in mounting plate 98, whereby plate 98 may be shifted laterally to horizontally adjust strike member 92 by loosening fasteners 100. Vertical adjustment of strike member 92 is accomplished by loosening nut 96 and moving carrier pin 94 upwardly or downwardly in a vertical slot (not shown) in mounting plate 98 within which pin 94 is received.

In FIGS. 5, 6 and 7, I have shown a knife-actuating arrangement designed to effect cutoffs of multiple lengths of packaging in a strip packaging operation. In such an operation groups of packages containing some predetermined number of packaged articles such as 6, 10 or 12 would be cut off into strips comprising a continuous length of wrapping web connecting the several packaged articles together. Strip packaging thus requires that the web cutoff knife be controlled in such a way as to permit a predetermined number of packaged articles to pass between the crimping and sealing dies 20 and 24 without interfering with the wrapping web between adjacent articles without severing the web. My improved guillotine-type of cutoff knife utilizing a reciprocial knife 72 contained within a slot in one of the rotary sealing dies is particularly well suited for a strip packaging operation. Since knife 72 is entirely contained within slot 74 in upper sealing die 20 and does not project outwardly beyond the peripheral surface of sealing head 20, the moving wrapping web may be sealed a plurality of times between a predetermined number of packaged articles by rotating sealing and crimping dies 20 and 24 without severing web 70 without interfering with the sealing operation in any way as long as knife 72 is not tripped. In order to control the actuation of knife 72 at predetermined intervals, I have mounted knife trip member 92 on reciprocating piston 104 of a double-acting pneumatic cylinder 106. Strike
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Member 92 is of the same configuration as that shown in FIGS. 1 and 3 and is secured to the outer end of piston 104 by a right angle elbow 108 in order that it may project into the orbital path of roller element 90 of the knife-operating mechanism. Pneumatic cylinder 106 is mounted by fasteners 110 to a plate 112 which is secured to shaft 22 for rotative movement therewith, and trip cam 122 thus revolves with shaft 22 and lower die head 24. As may readily be understood by reference to FIGS. 8 and 9, cam 122 will periodically strike roller or cam follower 90 as cam holder 120 rotates with shaft 22, thereby displacing cam follower 90 upwardly and causing link 76 to pivot to the position shown in FIG. 8. As link 76 pivots downwardly, it will pull knife 72 laterally across web 70 as well as downwardly therethrough in the manner described above with respect to the actuating arrangement of FIGS. 1 through 4. As knife 72 severs wrapping web 70, it will pass into receiving slot 88 in lower sealing die 20. The angular disposition of cam 122 on cam holder 120 is selected so that cam 122 will strike cam follower 90 and actuate knife 72 so as to sever web 70 at the precise instant that sealing dies 20 and 24 are directly opposite each other in sealing engagement with the opposite faces of web 70. Since cam 122 will engage roller or cam follower 90 as sealing dies 20 and 24 reach their maximum overlap for sealing engagement with moving web 70, cam 122 will also be rotating at a relatively high angular velocity, thereby bringing about the very rapid cutting action and subsequent retraction of knife 72. Thus, the revolving cam-type trip arrangement of FIGS. 8 and 9, like the stationary strike member 92 of FIG. 1 through 4, provides a clean, swift severing of wrapping web 70 without interfering with the sealing action of dies 20 and 24.

Those skilled in the packaging machinery art will readily appreciate that the penetrating, guillotine-like cutting action of knife 72 represents a distinct improvement over the pressure type of rotary cutting dies heretofore available. Not only does guillotine cutoff knife 72 provide a better cutting action, but also it insures improved sealing of the wrapping web by eliminating outwardly projecting cutoff dies which tend to hold the sealing and crimping dies apart. Knife 72 is also relatively simple and economical to replace, and its adjustment within upper sealing die 20 is not critical. The depth of knife penetration through the wrapping web is accurately controlled by properly adjusting trip member 92 or 122. Rotary cutoff dies of the anvil type shown in U.S. Pat. No. 2,546,721 require constant adjusting because of the links caused by the knife die and anvil die. As the rotary, anvil-type cutoff dies are adjusted outwardly to compensate for wear, they interfere more and more with the simultaneous pressure sealing of the rotary sealing dies to which they are secured.

It is to be noted that the gear train utilized to rotate shafts 18 and 22 may be employed to operate knife 72 through some mechanism other than rotary trip cam 122. The primary consideration is that the cutting stroke of knife 72 be coordinated with the angular disposition of rotary sealing dies 20 and 24 so that the severing of web 70 takes place when the sealing dies are in the proper position of alignment with each other so that knife 72 may pass cleanly into receiving slot 88 on die head 24. For purposes of my invention, the particular manner employed for sealing the opposite faces of wrapping web 70 together between adjacent entubed articles is of no particular significance. An adhesive material may be employed to seal the wrapping web between the oppositely disposed faces of sealing dies 20 and 24, or the well-known heat sealing method may be utilized. The wrapper engaging faces of the dies may be knurled or roughened so as to permit them to crimp the wrapper at the same time that it is sealed. However, for purposes of this invention, it is immaterial whether the wrapping web is crimped as well as sealed.
What is claimed is:

1. In a packaging machine having a station at which a moving, formed wrapping web enclosing spaced-apart articles is sealed and cut off between adjacent articles, the improvement comprising:
   a pair of oppositely disposed sealing dies directly mounted on separate, rotary shafts disposed parallel to each other in spaced apart relation, said sealing dies being rotatable with said rotary shafts through arcuate paths wherein said sealing dies intermittently come into direct alignment with each other and engage said wrapping web therebetween at only one point in said arcuate paths during each revolution of said rotary shafts;
   drive means for imparting rotational movement to said rotary shafts and said sealing dies;
   a recess within one of said sealing dies;
   a movable cutting knife housed within said recess and held therein in a normal position wherein its cutting edge does not project outwardly beyond the peripheral, web engaging surface of said one sealing die;
   an operating mechanism connected to said knife and operable to move said knife relative to said one of said sealing dies, out of said recess and through said wrapping web in a cutting motion;
   an opening within the other one of said sealing dies constructed and arranged to receive said knife as it cuts through said wrapping web; and
   trip means located in the arcuate path of said one sealing die and so constructed and arranged as to immediately contact and actuate said operating mechanism so as to fully extend said knife through its full cutting motion at the instant when said sealing dies are rotated to a position in direct alignment with each other, said trip means being further adapted to quickly release said operating mechanism as said sealing dies rotate past said aligned position, whereby said knife is actuated and released in rapid succession to provide a sharp, quick cutting action during the very short time interval that said opening within the other one of said sealing dies is in alignment with said knife.

2. Packaging apparatus as defined in claim 1, wherein:
   said knife is in the form of an elongated blade disposed transversely of the path of travel of said wrapping web;
   spring means biases said knife in said normal position within said recess; and
   said operating mechanism includes pivotal linkage elements connected to said knife and operative to overcome the pressure of said spring means and move said knife through said wrapping web in response to actuation by said trip means, said linkage elements being pivotally arranged in such a way as to carry said knife out of said recess along an angular path wherein said knife moves transversely with respect to said web as it cuts therethrough.

3. Packaging apparatus as defined in claim 1 wherein:
   said trip means comprises a cam carried on the same rotary shaft as is said other one of said sealing dies having said knife receiving opening therein; and
   said operating mechanism includes a contact element which is positioned to be struck and displaced by said cam upon each revolution of said sealing dies to thereby effect the actuation of said operating mechanism.

4. Packaging apparatus as defined in claim 1 wherein:
   said trip means comprises a strike member movable between a first position in which it is operative to strike and actuate and knife operating mechanism and a second position in which it is removed from the rotary path of said knife-operating mechanism; and
   control means operative to move said strike member from said second position to said first position in response to the movement of a predetermined number of articles past said sealing dies.

5. Packaging apparatus as defined in claim 4 wherein:
   said control means includes a fluid motor operatively associated with said strike member for moving said strike member between said first and second positions.

6. In a packaging machine having oppositely disposed sealing dies arranged to intermittently engage therebetween a continuous length of wrapping web between spaced apart articles eutled therein, the improvement comprising:
   first and second rotary shafts disposed parallel to each other in spaced-apart relation, said first shaft being rotatably supported at its opposite ends in floating bearing blocks;
   a first sealing die mounted on said first rotary shaft and having a recess therein within which a cut-off knife is movably supported;
   a second sealing die mounted on said second rotary shaft and having an opening therein adapted to receive said knife when it cuts through said wrapping web;
   spring means urging said floating bearing blocks and said first rotary shaft towards said second rotary shaft in order to maintain the proper pressure on said sealing dies as they are rotated into engagement with said wrapping web;
   an operating mechanism connected to said knife and operable to move said knife out of said recess and through said wrapping web as said web moves between said sealing dies; and
   a trip member mounted on one of said spring-loaded bearing blocks, said trip member being so positioned as to contact a portion of said knife operating mechanism and thereby initiate the cutting movement of said knife when said sealing dies are rotated to a position in direct alignment with each other in engagement with the opposite sides of said wrapping web.

References Cited

UNITED STATES PATENTS
2,960,808 11/1960 Pike 53—28 X
2,966,021 12/1960 Lane et al. 53—182

FOREIGN PATENTS
102,740 10/1962 Netherlands.

THERON E. CONDON, Primary Examiner
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U.S. Cl. X.R.
CERTIFICATE OF CORRECTION

Patent No. 3,524,301 Dated August 18, 1970

Inventor(s) Darwin Duane Zimmerman

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In claim 4, line 4, change "and" before "knife" to __sai___.

SIGNED AND SEALED
OCT 27 1970

(SEAL)

Attest:
Edward M. Fletcher, Jr.
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WILLIAM E. SCHUYLER, JR.
Commissioner of Patents