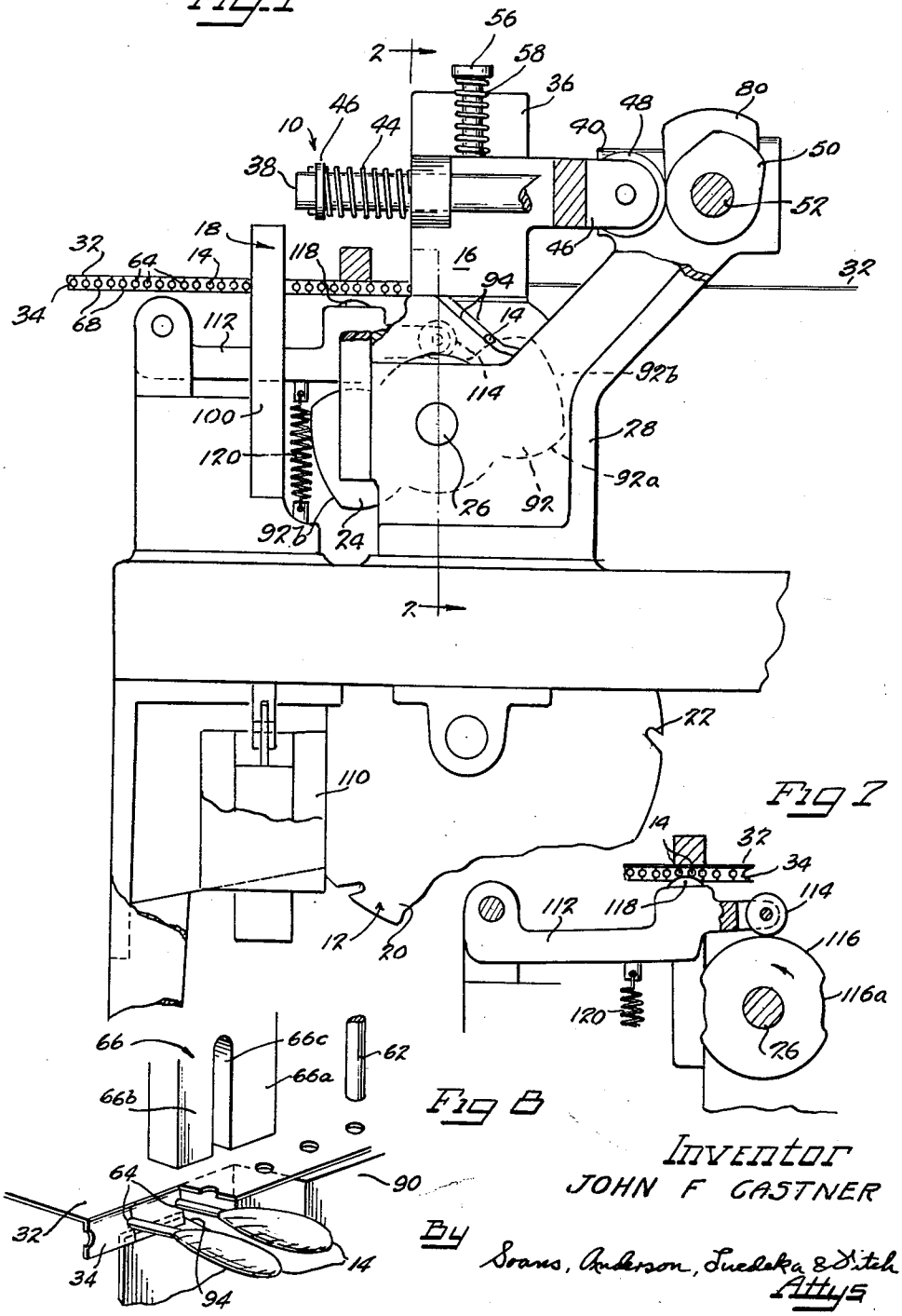
Jan. 22, 1963 J. F. CASTNER 3,074,212

PACKAGING APPARATUS

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Fig. 1



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Fig. 2

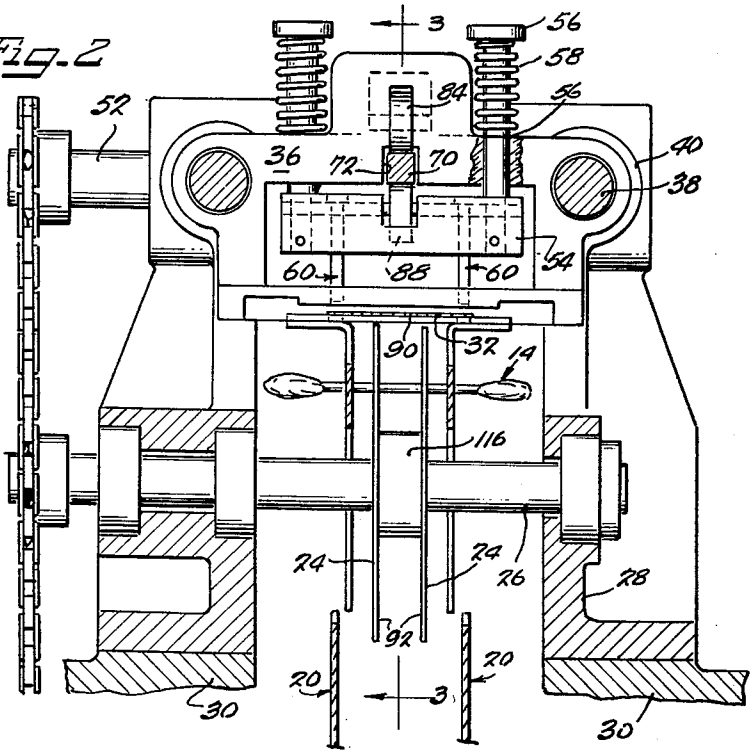
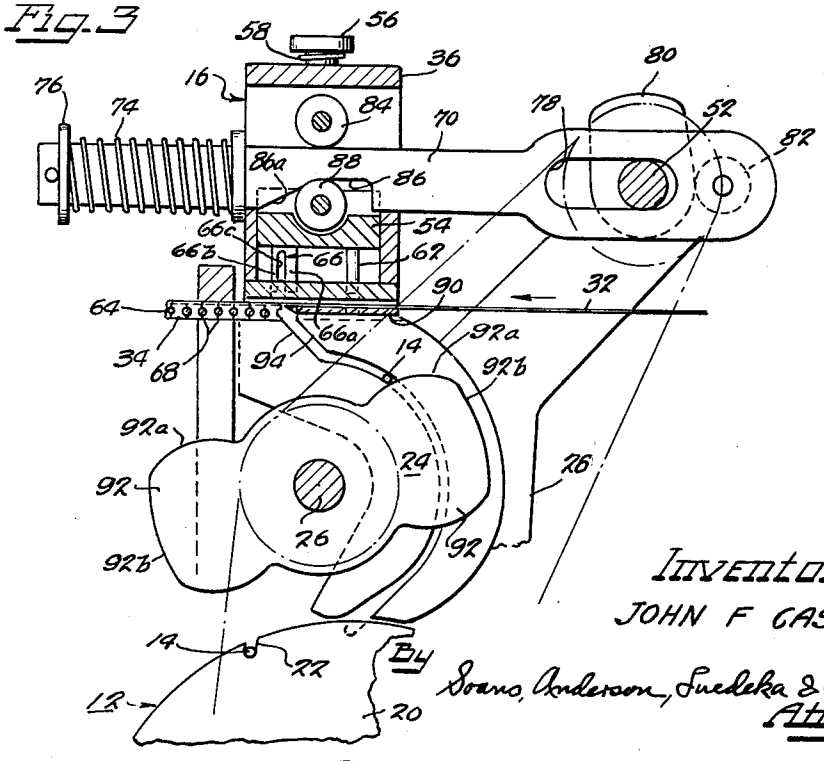


Fig. 3



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Fig. 4

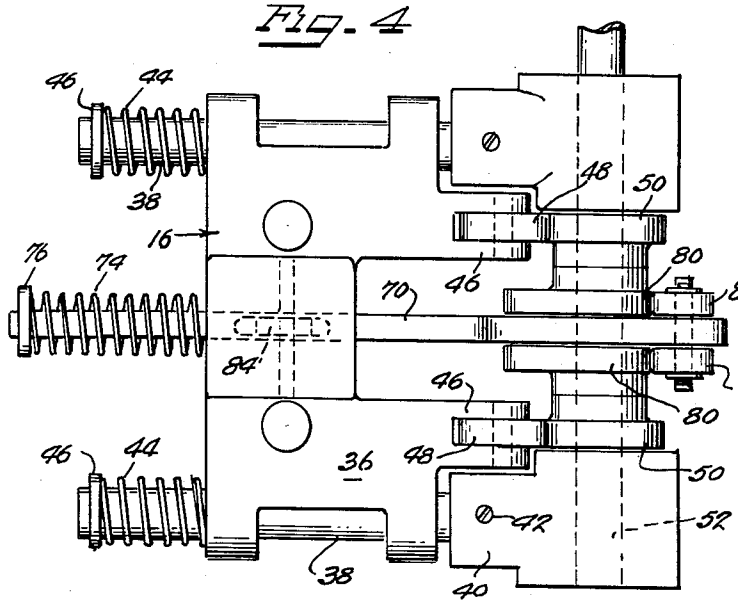


Fig. 5

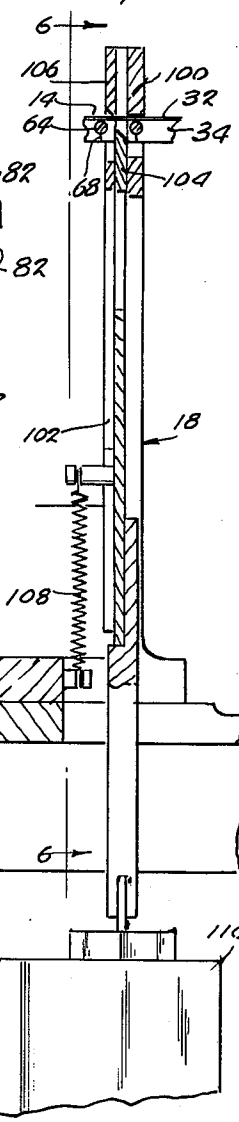
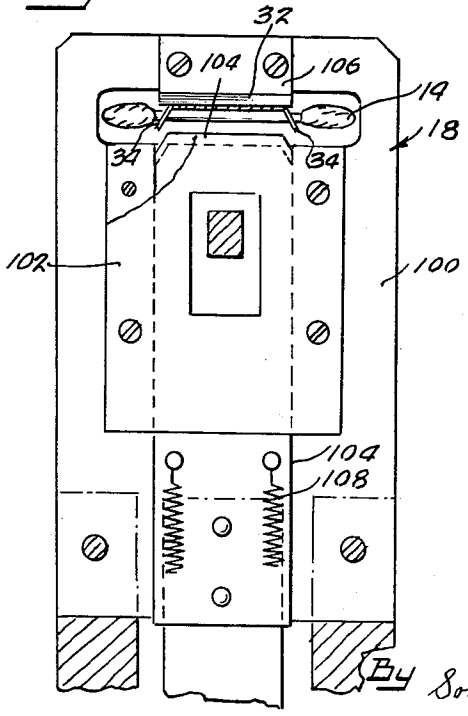


Fig. 6



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3,074,212

PACKAGING APPARATUS

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8 Claims. (Cl. 53—3)

The present invention relates to packaging apparatus, and is more particularly directed to a method and means for placing a plurality of items in fixed, spaced-apart relation along a flexible holder.

In the packaging of many items, particularly relatively small items, it is often desired that such items be placed on a card or the like in order to thereby provide a relatively firm and uniformly shaped package which can be readily wrapped or placed in a box, and in order to provide easy access to the individual items, without disturbing the remainder of the package. One such item is a cotton-tipped stick which is used for surgical and hygienic purposes. The present invention will be described with respect to such cotton-tipped sticks, but it will be understood that the invention may also be used to advantage in connection with other articles.

It is the principal object of the present invention to provide apparatus which is adapted to place a plurality of articles in uniformly spaced apart relation along a strip of deformable material. A further object is to provide a novel and improved method for the packaging of relatively small units in a manner affording easy access to the individual units. Still another object is to provide apparatus for the formation of flexible sheet material into strips having outwardly turned and slotted marginal edge portions, and for the placement of individual articles into each pair of aligned slots in the strip. Other objects and advantages will become apparent from the following description and the drawings (three sheets), wherein:

FIGURE 1 is a side elevation of the selected embodiment of the invention, with parts broken away and in section;

FIGURE 2 is a sectional view taken along the line 2—2 in FIGURE 1;

FIGURE 3 is a sectional view taken along the line 3—3 in FIGURE 2, with parts broken away;

FIGURE 4 is a top plan view of the structure shown in FIGURE 1;

FIGURE 5 is a sectional view of the cutting knife assembly seen in FIGURE 1, with parts broken away;

FIGURE 6 is a front elevational view taken along the line 6—6 in FIGURE 5;

FIGURE 7 is a fragmentary, side elevational view of the structure in FIGURE 1, with parts broken away and in section; and

FIGURE 8 is an enlarged, fragmentary view of structure seen also in FIGURE 1 and FIGURE 3.

In the packaging of relatively small items, such as the illustrated cotton-tipped applicators, numerous problems have existed for some time. It is desirable that the applicator package be neat in appearance and regular in shape and it is, of course, necessary that the applicators be handled and packaged under conditions which preserve the applicators in a clean state and afford sterilizing of the completed package. Then, too, it is important to the user that the applicators be packaged in such a manner that the individual applicators are readily accessible without disturbing the remainder of the package.

Generally, these objects are achieved by the packaging mechanism 10 seen in FIGURE 1, which includes a conveyor means 12 for transporting the cotton-tipped applicators 14 in spaced relation along a predetermined path, and a punch assembly 16 which is capable of deforming the opposite marginal edge portions of an elongated sheet

to provide a series of transversely aligned openings for receiving the applicators in detachably fixed relation to the strip. The strip may then be severed in selected uniform lengths by a cutter assembly 18, passed through a sterilizing device (not shown), and one or more strips may be suitably packaged in a box, sealed envelope, or the like.

The present invention is not concerned with the mechanism used in the formation of the cotton-tipped applicator and, therefore, such apparatus is not illustrated in the drawings. The conveyor 12, seen in FIGURE 1, might be mechanically associated with any of the known devices for forming the applicators, so as to receive individual applicators which are disposed transversely of the pair of conveyor discs 20 and nested in the transversely aligned notches 22 on the periphery of the discs. The conveyor 12 and the remainder of the packaging apparatus seen in the accompanying drawings are preferably suitably timed with the applicator-forming mechanism so as to insure proper feeding of the applicators to the packaging apparatus.

As noted particularly in FIGURE 2, the upper portions of the conveyor discs 20 are disposed in adjacent, lapping relation to an article transfer means 24 which is carried by a transverse shaft 26 suitably journalled on upwardly extending brackets 28 which are supported on the main frame portion 30 of the packaging apparatus. These upwardly extending brackets 28 also support the punch and die assembly 16, which is adapted to deform an elongated strip 32 of paperboard or the like, so as to present downwardly turned marginal portions 34 (FIGURES 1 and 6) having slitted openings therein for receiving the applicator sticks. More particularly, the punch and die assembly 16 includes a carriage 36 which is adapted to move lengthwise of the supporting brackets 28, and such movement is guided by a pair of rods 38 disposed at opposite sides of the punch assembly and having an end thereof fixedly received within a pair of cylindrical housings 40 formed in the upwardly extending brackets 28. The ends of the rods are suitably fixed in position in the housings 40, as by means of a set screw 42 which extends into the housing for engagement with a flat surface formed on the rod 38.

The forward end of each of the rods 38 includes a coil spring 44 (FIGURE 4) encircling the rod and seated between a washer 46 or the like and the forward face of the carriage 36. The rear portion of the carriage 36 includes a pair of spaced apart, bifurcated sections 46, each of which supports a roller 48 or the like. These rollers are co-axially disposed and positioned in engagement with a pair of eccentric cams 50 located on a rotatable cam shaft 52, which is supported by the brackets 28 and disposed transversely of the path of movement of the packaging strip. The cam shaft 52 is driven by, and timed with, the movement of the supporting shaft 26 for the forward end of the conveyor 12, and the cams 50 are designed to provide for intermittent movement of the carriage 36 to provide for reciprocating, horizontal movement of the punch assembly 16 in timed relation with the feed movement of the cotton-tipped applicators. As will be seen hereinafter, this forward movement of the punch assembly is effective to feed the strip material forwardly of the packaging apparatus a distance sufficient to place the suceeding pair of aligned openings in the packaging strip 32 in position to receive the succeeding applicator stick being delivered from the conveyor 12.

The punch assembly 16 (FIGURE 2) also includes a vertically movable punch block 54 which is fixed in suspended relation to the carriage 36 by a pair of vertically extending rods 36 which are slidably disposed through

vertical bores in the carriage. A coil spring 58 is provided intermediate an enlarged head portion of each rod 56 and the upper surface of the carriage 36, to thereby urge the block 54 into an elevated position. The block 54 carries punches 60 which are movable vertically with the block and which include a pair of transversely spaced apart, circular elements 62 (FIGURE 3) adapted to form transversely aligned openings 64 in the marginal portions of the paperboard strip 32. Forwardly of the circular punches is anothere pair of transversely spaced-apart punches 66, each of which is adapted to slit the paperboard transversely of the punched holes 64 and along the outer edge of the strip, as indicated at 68, and also to bend the marginal portions of the strip 32 downwardly. Each punch 66 comprises a rear element 66*a* and a forward element 66*b*, the two being spaced apart at their lower end by a vertical slot 66*c* which is adapted to embrace an applicator stick. The element 66*b* is adapted to rebend the marginal edge portion of strip 32 which lies intermediate the immediately preceding pair of transverse slits 68. The element 66*a* slits the paperboard transversely of the hole 64 to provide the slits 68, while also initially bending the portion preceding the slit downwardly. This deformation and slitting of the strip margins is accomplished while the applicator stick 14 is in adjacent, underlying relation to the packaging strip, to thereby positively fix the applicator in position relative to the packaging strip 32.

The vertical movement of the punch block 54 and the two pairs of punches 62 and 66 is achieved by a cam operated member 70 which is disposed centrally of the pairs of punches. More particularly, this member 70 is an elongated bar which is disposed through a center guideway 72 (FIGURE 2) provided by aligned grooves in the carriage 36 and in the movable punch block 54, and the bar 70 is yieldably held against forward movement by a coil spring 74 disposed about its forward end and held in place by a washer 76 or the like. The rearward coil of the spring 74 is seated on the forward face of the carriage 36. The rearward portion of the elongated bar is provided with an elongated slot 78 (FIGURE 3) through which the transverse cam shaft 52 is inserted. A pair of cams 80 are fixed to the shaft 52 and disposed adjacent to the bar 70 on opposite sides of the slotted end portion thereof in position for engagement with a pair of rollers 82 carried at the rear of the bar 70. An intermediate portion of the elongated bar is guided along its upper surface by a transverse roller 84 supported on the carriage 36. The lower portion of this intermediate section of the bar includes a cam groove or surface 86 which is engaged by a roller 88 supported on the movable punch block 54. Consequently, as the main cam shaft 52 revolves and the enlarged portion of the cams 80 encounter the rollers 82, the elongated bar 70 is moved rearwardly in opposition of the coil spring 74. Such rearward movement causes the roller 86 to contact the downwardly inclined surface 86*a* of the cam groove 86, thereby forcing the punching elements 62 and 66 downwardly into engagement with the strip 32 and the underlying die plate 90, which is also supported on the carriage 36 for movement therewith.

This downward movement of the punch element is, of course, timed with the delivery of an applicator stick 14 into a position underlying the packaging strip 32. More particularly, the article transfer meanst 24 on shaft 26 includes a pair of butterfly-shaped cams 92 which are fixed for rotation with the shaft. Each of the cams 92 includes a cam surface 92*a* (FIGURE 3) which is adapted to engage the transversely disposed applicator 14 and move it upwardly along the inclined surfaces 94 provided by a pair of plow or guide elements to a position immediately underlying the packaging strip 32. In FIGURES 1 and 3, the butterfly-shaped cam 92 is shown in a position of engagement with an applicator which has been picked up from one of the pairs of notches 22 on conveyor 12 and moved part way up the inclined surface 94 of the plows. As the applicator reaches its ultimate position of elevation, it is supported by the succeeding cam surface 92*b* of the butterfly cam during the forward movement of the packaging strip and the subsequent movement of the punch elements, to effectively secure the applicator in position between a pair of the opening defining sections of the strip margins.

As indicated previously, the applicator is positioned in a pair of the transversely aligned openings 64 in the strip 32, after the forward portion of the two marginal sections defining the opening has been bent downwardly, but prior to any bending of the complementary rearward marginal portions. The forward punch 66 includes a slotted central portion 66*c* which separates the strip bending portion of the die from the slitting portion. Consequently, it is seen that a single motion of the punch assembly is effective to bend downwardly a marginal portion of strip 32, intermediate adjacent openings 64, to slit the succeeding marginal portion at the edge of its opening 64, and also bend such portion downwardly, and to punch another opening or hole 64 in a succeeding marginal portion of the strip 32 with the punch 62.

As the punches move downwardly into the die plate 90, and effect the aforementioned punching of the holes, slitting of the edges, and bending of the marginal sections, the pair of cams 50 (FIGURE 4) operate to move the entire punch assembly forward along the main frame 30. Such movement is effective to also move the strip 32 and places the succeeding openings 64, which are then being formed by the punches 62, in position at the end of the track 94 to receive the next applicator. The pair of cams 80 controlling the movement of the elongated bar 70 then rotate to permit the elongated bar 70 to move forwardly until the roller 88 (FIGURE 3) engages the horizontal portion of the cam surface 86. At this point the block 54 and the punching elements supported thereby move upwardly under the urging of the coil springs 58. The punch assembly is returned to its initial position by further operation of the pair of cams 50 controlling carriage 36, and the assembly is thereby placed in position to repeat the punching operation in timed relation with the delivery of the next applicator stick.

As the formed strip 32 (FIGURE 1) containing a plurality of applicators 14 moves forwardly, it passes through the cutter assembly 18 which is adapted to sever the strip intermediate adjoining applicators, so as to provide a strip of predetermined length and containing a predetermined number of applicators. The movement of the cutter assembly 18 is preferably timed with the applicator delivery and the punching operation in any known manner. As illustrated, the cutter assembly includes a frame 100 (FIGURES 5 and 6) having attached thereto a pair of spaced-apart plates 102 which provide a guide for a vertically slidable knife 104. An anvil 106 is provided on the frame 100 at the upper end thereof in position for engagement by the knife 104. A pair of coil springs 108 are fixed between the frame and the knife to urge the knife into its cutting position. A solenoid 110 (FIGURE 1) is connected with the lower end of the knife and is suitably arranged in the controlling circuit so that the knife 104 is held in its lowermost position upon energization of the solenoid and is permitted to move upwardly under the biasing action of the coil springs 108 when the solenoid is de-energized. The opposite ends of the cutting edge of the knife are tapered, as seen in FIGURE 6, to accommodate the downwardly turned marginal portions 34 of the packaging strip 32.

There is also preferably provided means for releasably holding the strip 32 in position during the delivery of an applicator to the strip. In the illustrated apparatus, such means comprises a member 112 (FIGURE 1) which is pivotally connected and supported on the main frame at one end, and which has a roller 114 disposed at its other end in position for engagement with a cam wheel

116 (FIGURE 7) fixed to the main drive shaft 26. An intermediate portion of this member 112 includes a button-like boss 118 which is adapted to engage the undersurface of the strip 32 containing the applicators and momentarily hold the strip against undesired movement. As the cam wheel 116 rotates, the raised portions of the cams are effective to elevates the button 118 into engagement with the package strip 32, and as the roller 114 encounters the depressed portions 116*a* of the cam, the button 118 is moved downwardly away from the strip under the biasing action of a spring 120 to permit the forward movement of the strip described above.

Although shown and described with respect to particular apparatus, packaging material, and particular articles to be packaged, it will be understood that various features of the invention might be utilized to advantage in connection with other forms of the apparatus, and in the handling of other types of packaging material, and with other articles to be packaged.

Various of the features of the invention believed to be new are set forth in the appended claims.

What is claimed is:

1. Packaging apparatus comprising means for feeding an elongated strip of sheet material through a predetermined path, a punch assembly disposed for movement into engagement with a portion of the strip, said punch assembly comprising means for forming a pair of transversely aligned holes in the opposite marginal edge portions of the strip, means for similarly bending such marginal portions out of the plane of the strip, and comprising means for slitting the strip transversely from each edge thereof to the adjacent opening, and means for moving an elongated article toward said predetermined path and into position within the holes formed in the strip margins.

2. Packaging apparatus comprising a punch assembly disposed for movement into engagement with a leading portion of a strip of sheet material fed into said punch assembly, said punch assembly comprising means for forming a pair of transversely aligned holes in the opposite marginal edge portions of the strip, means for similarly bending the marginal portions of the strip out of the plane of the strip proper, and comprising means for slitting the strip transversely from each edge thereof inwardly to the adjacent opening formed in the strip marginal portions, means for moving an elongated article toward said punch assembly and through the slits in the strip into engagement by the holes formed in the strip margins, and means for reciprocating said punch assembly during the punching operation thereof to thereby move the strip of sheet material through a predetermined path and sequentially position each pair of said transversely aligned holes in position to receive an elongated article from said article moving means.

3. Package forming mechanism comprising a frame structure, conveyor means supported by said frame structure and adapted to deliver elongated articles through a predetermined path to a first position thereon with the articles disposed transversely of the direction of movement of said conveyor, means at said first position for transferring an article from said conveyor to an elevated position above the path of the conveyor, and a punch assembly disposed above the conveyor and adapted to form a strip of deformable sheet material to receive the articles in spaced-apart relation thereon, said punch assembly comprising a carriage supported for reciprocating movement above and parallel to the conveyor path, means for controlling the movement of said carriage in timed relation with the movement of the conveyor, a punch and die means supported on said carriage for movement therewith, said punch being supported also for vertical movement relative to the die and including transversely spaced-apart elements for punching a pair of transversely aligned holes in marginal portions of a strip of sheet material disposed between said punch and die, for transversely slitting the strip margins intermediate the hole and the strip edge, and for bending the slitted marginal portions out of the plane of the strip to form similarly turned flange portions for the strip, said control means for said punch assembly being operable to move said assembly forwardly during the punching operation to thereby serve as a feed means for the strip material.

4. Package forming mechanism comprising a frame structure, conveyor means supported by said frame structure and adapted to deliver elongated articles through a predetermined path, a punch assembly disposed in position to receive articles from the conveyor and adapted to form a strip of deformable sheet material to receive the articles in spaced-apart relation thereon, said punch assembly comprising a carriage supported for reciprocating movement, means for controlling the movement of said carriage in timed relation with the movement of the conveyor, a punch means supported on said carriage for movement therewith, said punch being supported also for vertical movement relative to the die and including transversely spaced-apart elements for punching a pair of transversely aligned holes in marginal portions of a strip of sheet material disposed between said punch and die, for transversely slitting the strip margins intermediate the hole and the strip edge, and for bending the slitted marginal portions out of the plane of the strip to form similarly turned flange portions for the strip, means for controlling the movement of said punch, means in timed relation with the movement of said carriage and said conveyor, whereby said punch means is operated as said carriage is moved forwardly to thereby serve as a feed means for the strip material.

5. Packaging apparatus comprising a frame structure, conveyor means supported by said frame structure and adapted to deliver elongated articles through a predetermined path to a first position thereon with the articles disposed transversely of the direction of movement of said conveyor, means at said first position for transferring an article from said conveyor to an elevated position above the path of the conveyor, a punch assembly disposed above the conveyor and operable to form a strip of deformable sheet material which is adapted to receive the articles in spaced-apart relation thereon, said punch assembly comprising a carriage supported on said frame structure for reciprocating movement above and parallel to the conveyor path, means for controlling the movement of said carriage in timed relation with the movement of the conveyor, a punch and die means supported on said carriage for movement therewith, said punch means being supported also for vertical movement relative to the die and including transversely spaced-apart elements operable to simultaneously (1) punch a pair of transversely aligned holes in marginal portions of a strip of sheet material disposed between said punch and die, (2) transversely slit the strip margins intermediate a previously formed hole and the strip edge, and (3) bend previously slitted marginal portions out of the plane of the strip to form similarly turned flange portions for the strip, means for controlling the movement of said punch means in timed relation with the movement of said carriage and said conveyor, whereby said punch means is operated as said carriage is moved forwardly to thereby serve as a feed means for the strip material and re-position the strip material so that the succeeding holes therein are in position to receive a succeeding article.

6. Packaging apparatus comprising a frame structure, conveyor means supported by said frame structure and adapted to deliver elongated articles through a predetermined path to a first position thereon with the articles disposed transversely of the direction of movement of said conveyor, means at said first position for transferring an article from said conveyor to an elevated position above the path of the conveyor, a punch assembly disposed above the conveyor and operable to form a strip of deformable sheet material which is adapted to receive

the articles in spaced-apart relation thereon, said punch assembly comprising a carriage supported for reciprocating movement above and parallel to the conveyor path, means for controlling the movement of said carriage, a punch and die means supported on said carriage for movement therewith and for vertical movement of the punch means relative to the die, said punch means including transversely spaced-apart elements for punching a pair of transversely aligned holes in marginal portions of a strip of sheet material disposed between said punch and die, for transversely slitting the strip margins intermediate the hole and the strip edge, and for bending the slitted marginal portions out of the plane of the strip to form similarly turned flange portions for the strip, drive means connected with said conveyor, said article transfer means, said carriage, and said punch means to provide for timed movement thereof, and means forwardly of said punch assembly for transversely severing the strip intermediate adjoining articles to provide a package strip including a selected number of articles.

7. A method of packaging elongated articles comprising the steps of moving an elongated strip of deformable sheet material through a predetermined path, forming a pair of transversely aligned holes through the opposite marginal portions of the strip, transversely slitting the marginal portions of the strip between each hole and the strip edge, bending the strip marginal portions defining the forward half of the aligned holes into a position angularly disposed with respect to the strip proper, placing one of the elongated articles in adjacent, transverse juxtaposition relative to the strip with the article engaging bent marginal portions of the strip, to thereby place the hole defining section of each portion in partially encircling relation to the article, and then slitting and similarly bending the strip marginal portions immediately rearward of the article to thereby place the hole defining section of such rearward portions in partially encircling relation to the article, whereby the article is held in position by the adjoining hole defining sections and is removable through the slits formed in the edges of the strip.

8. A method of packaging elongated articles comprising the steps of moving an elongated strip of deformable sheet material through a predetermined path, forming a pair of transversely aligned holes through the opposite marginal portions of the strip, transversely slitting the marginal portions of the strip between each hole and the strip edge, bending the strip marginal portions immediately forward of the slit out of the plane of the strip proper and in similarly angled relation thereto, placing one of the elongated articles in engagement with the hole defining edges of the bent marginal portions, to thereby place such edges in partially encircling relation to the article, slitting and similarly bending the strip marginal portions immediately rearward of the article to thereby place the hole defining sections of such rearward portions in partially encircling relation to the article, whereby the article is held in position by the adjoining hole defining sections and is removable through the slits formed in the edges of the strip, sequentially forming succeeding portions of the strip in a like manner and sequentially placing additional, similar articles in the formed strip, and severing said strip transversely to provide a package containing a plurality of the articles in spaced-apart relation on the strip and individually detachable therefrom.

References Cited in the file of this patent

FOREIGN PATENTS

52,263 Netherlands ---------- Apr. 15, 1942