May 30, 1967 T. L. HARRISON ETAL 3,322,600

APPARATUS FOR APPLYING CLOSURE TAPE TO PACKAGE FORMING WEBS

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Fig. 1

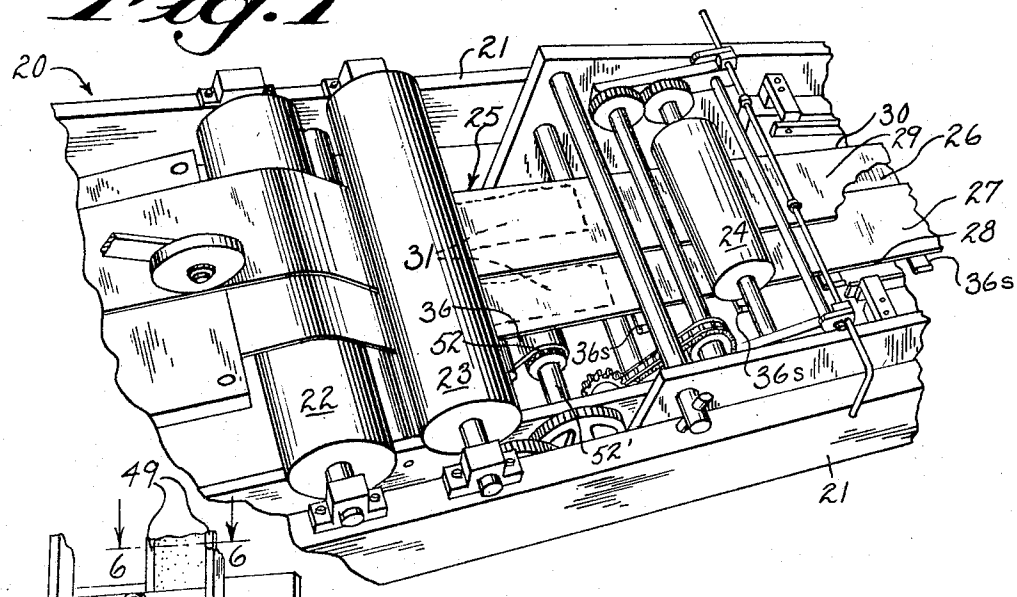


Fig. 2

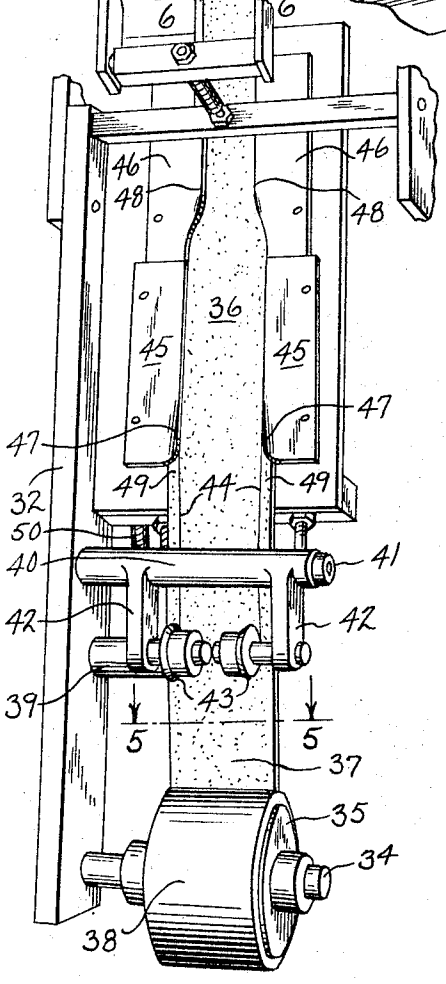


Fig. 5

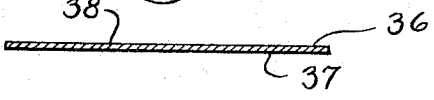
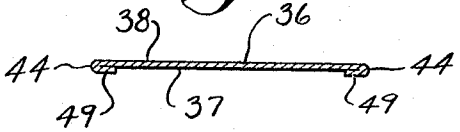


Fig. 6



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Fig. 3

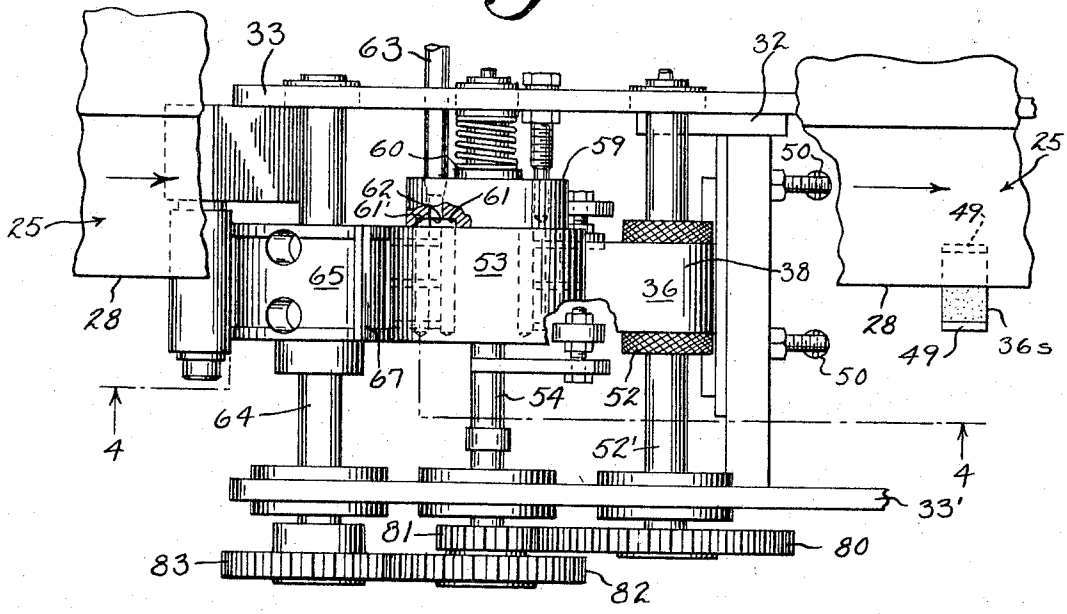


Fig. 7

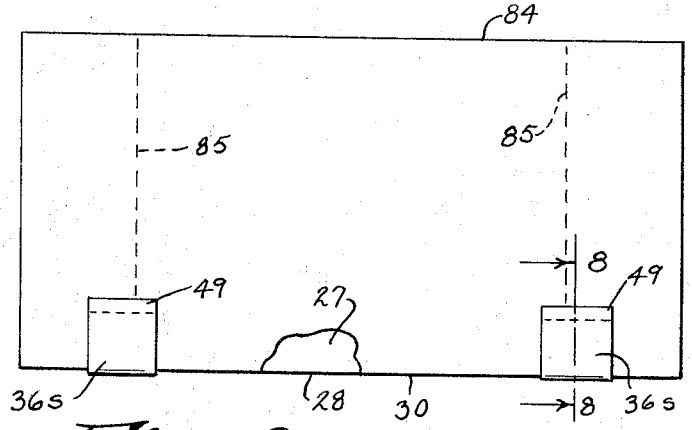
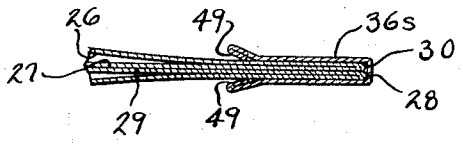


Fig. 8



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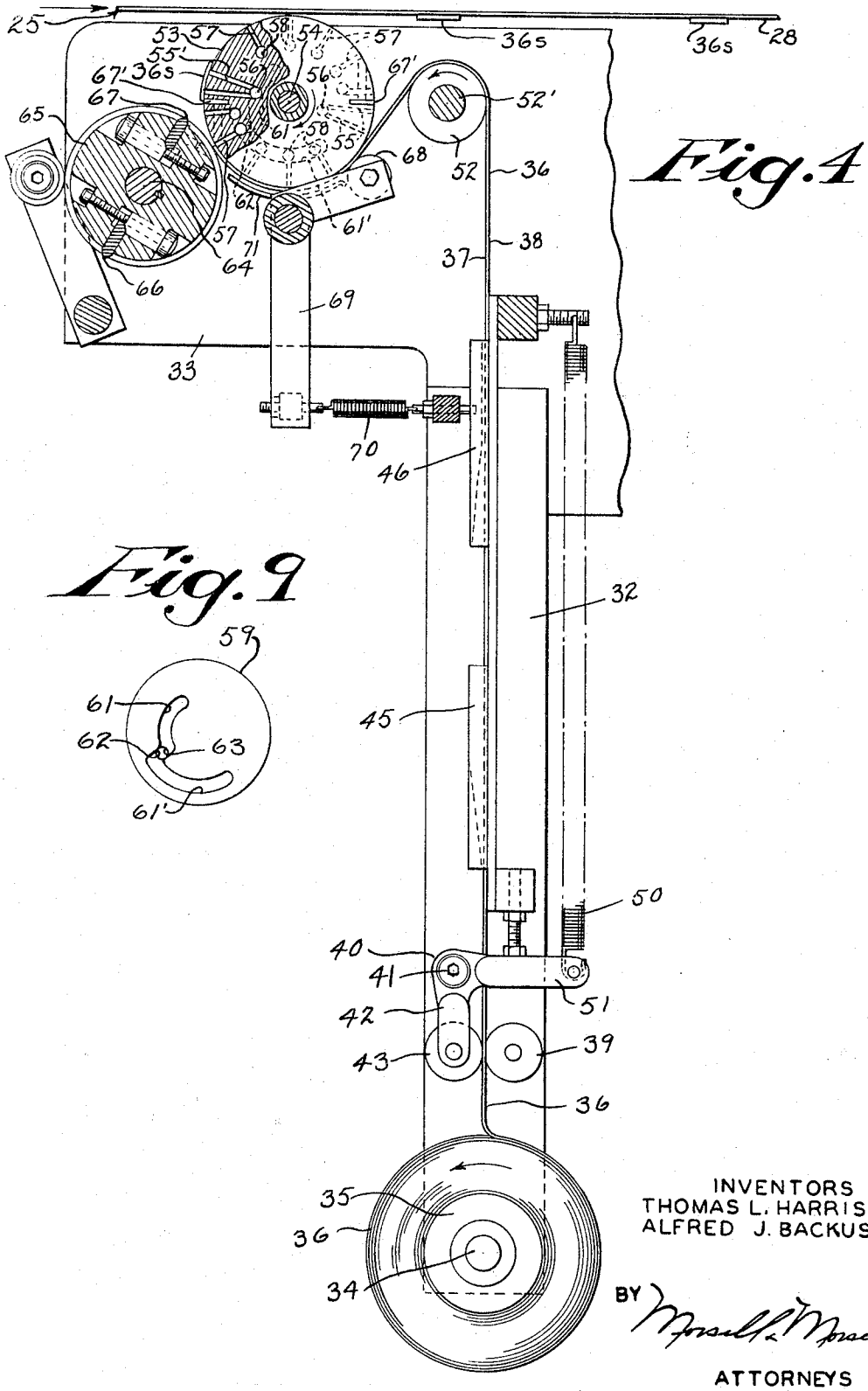


Fig. 4

Fig. 9

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APPARATUS FOR APPLYING CLOSURE TAPE TO PACKAGE FORMING WEBS

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Filed Nov. 19, 1963, Ser. No. 324,773
10 Claims. (Cl. 156—461)

This invention relates to improvements in apparatus for applying closure tape to package forming webs.

In the packaging of items which must be kept in sanitary condition it is important that provision be made for easy opening of the packages with a minimum of manipulation so that the user will not be delayed when he is ready to use the item.

In the packaging of items of this type there is a continuously moving web having a back panel portion on which the items are disposed, one on each side of the longitudinal center line. There are also web side portions which are folded over the items and into overlapping relationship with each other. During final stages, the package is folded on its longitudinal center line which is between the items, the package ends being folded in. When the two outer fold edges of the back panel are brought into juxtaposition with one another, it is desirable to use short strips of adhesive tape to hold them together in closing position. It has been found, however, that there is difficulty in removing the strips of adhesive tape when it is desired to open the package. Such inconvenience and delay can be quite serious when the package contains certain types of items.

It is a general object of the present invention to provide improved apparatus for continuously applying, in a simple and expeditious manner, spaced strips of adhesive tape to package-forming webs while the packages are in partially-formed condition and still part of a continuously moving web.

A further object of the invention is to provide apparatus as above described including novel means whereby each strip of adhesive tape has folded-over ends prior to application whereby these ends are prevented from adhering to the package so as to provide readily grippable pull tabs for facilitating the stripping of the strips of tape from the package to open the same.

A further object of the invention is to provide novel apparatus for applying adhesive strips to packages, which apparatus includes novel suction means for presenting the tape to a cutter and for holding the cut strips of tape in operative position until they have been applied to the package-forming web.

With the above and other objects in view, the invention consists of the improved apparatus for applying closure tape to package-forming webs, and all of its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawings, illustrating one complete embodiment of the preferred form of the invention, in which the same reference numerals designate the same parts in all of the views:

FIG. 1 is a fragmentary perspective view of a portion of a package-forming machine at the area of tape application;

FIG. 2 is a fragmentary elevational view showing the lower portion of the tape supplying, creasing, folding and feeding mechanism;

FIG. 3 is a top view of a portion of the mechanism of FIG. 1, parts being broken away;

FIG. 4 is a sectional view taken on a line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken on a line 5—5 of FIG 2;

FIG. 6 is a sectional view taken on a line 6—6 of FIG. 2;

FIG. 7 is a plan view of one of the completed taped and closed packages, part of the front being broken away;

FIG. 8 is a sectional view taken on a line 8—8 of FIG. 7; and

FIG. 9 is a view looking at the inner face of the suction header.

Referring more particularly to the drawings, first to FIG. 1, the numeral 20 designates a package-forming machine having a suitable frame with side rails 21 for supporting the package-forming mechanism including the rotatable rollers 22, 23 and 24. Suitably guided through the machine between the rollers 22 and 23 and below the roller 24 is a traveling web 25 of packaging material, usually formed of paper or like material. This web includes a longitudinal back panel portion 26 (FIG. 1), a longitudinal portion 27 which is folded on the edge 28 over one article 31 which is within the package, and an opposite longitudinal top portion 29 which is folded over the other item 31 in the package on a fold line 30, which portion 29 overlaps the free edge of the top portion 27. A pair of items 31 to be packaged is shown dotted in position in FIG. 1, it being understood that there are similar pairs at regular intervals in the web.

Suitably supported on an arm 32 which depends below the portion of the machine shown in FIG. 1 and which arm connects with an enlarged upper frame portion 33 is a spindle 34 on which a tap supply roll 35 is rotatably mounted, said roll carrying a supply of adhesive tape 36, which tape has an adhesively-coated side 37 and an uncoated side 38 (see FIGS. 2 and 4). The adhesive is a suitable pressure-sensitive type.

Suitably supported on the arm 32 is a back-up roller 39, in front of which tape which has been stripped from the roll 35 passes. A pin 41 projecting from a side of the arm rockably supports a sleeve 40. The sleeve has downwardly-projecting legs 42, the lower ends of which rotatably support creasing rollers 43 which have circular creasing edges engageable with the tape to crease the latter on lines 44. The lines 44 are spaced inwardly about one-quarter of an inch from the edges of the tape. The creased tape then passes beneath pairs of overhanging stationary folding members 45 and 46 which have flanges 47 and 48 respectively. The flanges 47 are curved outwardly at the entrance ends and then gradually flatten out and are constructed as is well-known in the art, to cause a folding of those tape portions 49 which are outside of the crease lines 44, the flanges 48 of the members 56 completing the action and bringing the portions 49 over into juxtaposition with the adhesive side, as is shown in FIG. 6, the adhesive adhering to itself to hold the edges in the in-folded position illustrated. Any other well-known type of device for folding the edges 49 over may be employed. The creasing rolls are constantly urged into creasing position by means of a spring 50 (see FIG. 4) which constantly pulls upwardly on an arm 51 projecting rearwardly from the sleeve 40.

The tape 36 emerges from the upper members 46 in the edge-folded form shown at the top of FIG. 2 and also shown in FIG. 6. It then passes upwardly over a knurled metal feed roll 52 (FIG. 4) with its adhesive side against the roll. From the feed roll the tape passes downwardly beneath a suction or tape-applying roll 53 and between it and a curved guide 71. The suction roll and feed roll are suitably mounted on shafts 54 and 54' which are journaled for rotation between frame members 33 and 33' (see FIG. 3). The suction roll is provided with pairs of long radial cut-strip-holding suction ports 55 and 55' which are oppositely disposed. The inner ends of the ports 55 and 55'

communicate with axial ducts **56** which are positioned a predetermined distance from the axis of the roll. Other radial ports **57**, sometimes called tape-holding suction ports, are shorter in length and each communicates with an axial duct **58** which is farther away from the center of the roll than the axial ducts **56**.

Non-rotatably, but axially, slidably supported adjacent an end of the suction roll is a suction header plate **59** (see FIGS. 3 and 9) which is urged by a spring **60** into frictional engagement with the end of the suction roll, there being a suitable peripheral seal. The inner face of the header has arcuate recess portions **61** and **61'** which are connected by a radially bent leg portion **62**. A suction line **63** (FIG. 3) communicates with the arcuate portions of the suction header.

Rotatably mounted on a shaft **64** which is suitably journaled in the frame is a cutter roll **65** having oppositely disposed transverse cutters **66** and **67**. From FIG. 3 it will be noted that the suction roll **53** and cutter roll **65** are so positioned that about half of their axial length is overlapped by the folded margin **28** of the web **25**.

The shaft **52'** for the knurled feed roller **52** is suitably driven and it has rigidly mounted thereon a gear **80** which meshes with a much smaller gear **81** on the shaft **54** for the suction roll. In the preferred embodiment, the suction roll is driven at three times the speed of the knurled feed roll. Also mounted on the shaft **54** for the suction roll is another gear **82** which meshes with a gear **83** of like diameter rigidly mounted on the shaft **64** for the cutter **65** to drive the latter.

Operation

In operation, some time prior to the folding over of the portions **27** and **29** of the web **25** to the position shown in FIG. 1, articles **31** to be packaged are suitably laid in position on the back panel portion **26**. As the web travels along in the portion of the machine shown in FIG. 1, it is the purpose of the present invention to apply adhesive strips **36***s* at spaced intervals to the underside of the web, with half of the length of each strip adhering to the underside of the web and half projecting beyond the edge **28** as shown in FIG. 1, with the adhesive facing upwardly from the projecting end. This application of the adhesive strips is accomplished expeditiously by the mechanism just described and shown more particularly in FIGS. 2, 3 and 4.

Referring first to FIG. 4, after the web of adhesive passes from the knurled feed roll **52** with its adhesive side facing downwardly, it is fed beneath the tape-applying or suction roll **53** with the non-adhesive side contacting the suction roll. A suitable pressure roller **68** which is mounted on the swinging end of a bell crank lever **69** initially presses the tape against the suction roll, the pressure roll being urged against the suction roll by the spring **70**.

The web then passes within an arcuate guiding strip **71**. The knurled feed roll **52** is pushing the web of tape forwardly at a relatively slow rate of speed while the suction roll is rotating at a substantially higher speed. Shortly after the tape contacts the suction roll it is acted on by some of the short radial suction ports **57** as soon as they come into communication with the header recess portion **61'**. Inasmuch as the non-adhesive side of the tape is against the suction roll and due to the difference between the speed of feed of the tape and the speed of rotation of the suction roll there is slippage between the suction roll and the tape notwithstanding the suction action from the short ports **57**. Immediately after the leading end of the strip of tape passes the nip between the suction roll and the cutter roll the axial port **56** of one of the sets of long radial ports **55** or **55'** comes into communication with the innermost arcuate recess portion **61** so that suction in the ports **55'**, as shown in FIG. 4, acts on the leading end of the web of tape to hold this end against the suction roller after it has been severed by engagement of the knife **67** of the cutter with the bed knife **67'** on the suction roll. By this time the short radial ports **57** are out of communication with the suction recess and the severed piece of tape **36***s* is held to the roll solely by the suction in the ports **55'**. This severed piece of tape, which is about one inch in a circumferential direction on the roll, is held onto the roll until the tape meets the underside of the traveling web **25**. There the adhesive connects the inner half of the length of the strip **36***s* to the underside of the packaging web **25** and, as soon as the adhesive takes over, the axial suction duct **56** passes beyond the arcuate recess portion **61** and suction is cut off so that the web can take the strip away, as shown in FIG. 4. Due to the feed action from the feed roll **52** the leading end of the tape will slowly advance on the suction roll, in spite of the slippage between the two, until said end is beyond the nip between the suction roll and cutter rolls. Thereafter the other knife **66** will come around to cut off another strip of tape which is one inch in circumferential length on the suction roll. The arrangement is so worked out that one inch of tape is cut off and advanced for each 180 degrees of rotation of the suction roll **53**.

The tape is preferably cut off in one inch pieces circumferentially of the suction roll. The length of these pieces runs transversely of the suction roll and is preferably about two inches, which is the width of the tape web shown in FIG. 6. After the strips of tape **36***s* have been applied in the projecting condition to the web **25** of packaging material as shown in FIGS. 1 and 3, the web advances and the packaging machine eventually folds the web on its longitudinal center line, which then becomes the folded edge **84** of the package shown in FIG. 7, the web **25** of FIG. 1 having been cut into lengths and the ends of the lengths having been tucked in as at **85**. After the web **25** of FIG. 1 is folded on its longitudinal center line to bring the folded edge **30** into juxtaposition with the folded edge **28**, the projecting ends of the strips of tape **36***s* are folded over in the manner shown in FIGS. 7 and 8 to hold the package in closed position.

Due to the fact that the tape-feeding mechanism has previously folded over the edges **49** of the adhesive tape, the adhesive is covered for a short distance inwardly from each end of each strip. Thus, these ends will not adhere to the package (see FIG. 8) and make convenient pull tabs which may be easily gripped to strip the tape from the package in opening the same. This is very important in connection with items where quick opening of the package must be ensured. In the case of such items it is important that they be kept sealed in the packages in a sanitary condition until just before they are to be used and, at the time of use, it is important that they be made available quickly without any complications.

Various changes and modifications may be made without departing from the spirit of the invention, and all of such changes are contemplated as may come within the scope of the claims.

What we claim is:

1. Apparatus for applying strips of closure tape to the edge of a moving web of packaging material comprising a tape-applying roll rotatably mounted in a position adjacent the moving web with a peripheral portion only partly overlapped by the edge of the web and rotatable against said overlapping portion of the web and in the same general direction, means for temporarily holding a strip of adhesive tape with the adhesive side facing outwardly transversely of a peripheral portion of said tape-applying roll which is moving toward said web and in a position where part only of the length of the strip will be overlapped by the web, and a control for said holding means operable to cause release of said strip of tape from the roll as the outwardly-facing adhesive on the overlapped part unites with the web.

2. Apparatus for applying spaced strips of closure tape to a moving web of packaging material comprising a tape-applying roll rotatably mounted in a position adjacent the moving web with a peripheral portion rotatable against a portion of the web and in the same general direction,

means for feeding tape to a portion of the periphery of said tape-applying roll which is remote from the web with its adhesive side facing outwardly and at a speed less than the speed of rotation of the tape-applying roll, a first means including suction ports for temporarily holding said fed tape against said peripheral portion, cutting means positioned adjacent said tape-applying roll for severing the tape at periodic intervals to provide severed strips on the periphery, a second means for temporarily holding each severed strip against the roll as it is being moved toward the web and away from the tape, and a control for said two holding means operable to cut off suction to said suction ports for said first holding means when said suction ports move to uncovered position with respect to the tape and just as the second holding means becomes effective on the severed strip and there being means included in said second holding means for causing release of each strip from the roll as the outwardly-facing adhesive unites with the web.

3. Apparatus for applying spaced strips of closure tape to a moving web of packaging material comprising a tape-applying roll rotatably mounted in a position adjacent the moving web with a peripheral portion rotatable against a portion of the web and in the same general direction, a rotatably-mounted supply roll for tape, a rotatably-driven feed roll positioned to feed tape to a portion of the periphery of said tape-applying roll which is remote from the web with the adhesive side of the tape facing outwardly, means between said supply roll and feed roll for folding at least one edge of the tape inwardly against the adhesive side, means for temporarily holding tape fed from said roll against the periphery of said tape-applying roll, means positioned adjacent said tape-applying roll for periodically severing the tape transversely to provide severed strips extending transversely of the periphery of the tape-applying roll each having an infolded end, means for temporarily holding each severed strip against the roll as it is being moved toward the web, and a control for said holding means operable to release each strip from the roll as the outwardly-facing adhesive unites with the web with the infolded end of the tape facing outwardly and extending longitudinally of the web.

4. Apparatus for applying spaced strips of closure tape to a moving web of packaging material comprising a tape-applying suction roll rotatably mounted in a position adjacent the moving web with a peripheral portion rotatable against a portion of the web and in the same general direction and having radial suction ports communicating with axial suction ducts, a driven feed roll for feeding tape to a portion of said tape-applying roll which is remote from the web, means for supplying a continuous length of tape to said feed roll with the adhesive side against the feed roll, a suction header against an end of the suction roll and having radially offset arcuate suction recesses, some of said axial suction ducts being so positioned in the roll that they register with the suction recess of the header at a time to cause certain suction ports to temporarily hold tape fed by the feed roll against the periphery of the tape-applying roll with the adhesive side of the tape facing outwardly only when said ports are covered by said tape, cutting means positioned adjacent said tape-applying roll for severing the tape to provide severed strips on said periphery, other axial suction ducts being positioned so that they register with the recess of the suction header to cause other suction ports to temporarily hold each severed strip against the roll as it is being moved toward the web, and said last mentioned axial ducts moving out of registration with the recess of the suction header at a time to release each strip from the roll as the outwardly-facing adhesive unites with the web.

5. Apparatus for applying spaced strips of closure tape to a moving web of packaging material comprising: a tape-applying roll rotatably mounted in a position adjacent the moving web so that a peripheral portion is only

partly overlapped by the edge of the web and rotatable against a portion of the web and in the same general direction, a rotatably mounted supply roll for tape, a rotatably driven feed roll positioned to feed tape to a portion of said tape-applying roll which is remote from the web with the adhesive side of the tape facing outwardly, means for temporarily holding tape fed from said feed roll against the periphery of said tape-applying roll in a position where only part of the transverse dimension of the tape on the applying roll will be overlapped by the web with the remaining part adapted to project laterally from the web, means positioned adjacent said tape-applying roll for periodically severing the tape transversely to provide severed strips extending transversely of the periphery of the tape-applying roll, means for temporarily holding each severed strip against the roll as it is being moved toward the web, and a control for said holding means operable to release each strip from the roll as the outwardly-facing adhesive unites with the web.

6. Apparatus for applying spaced strips of closure tape to a moving web of packaging material comprising: a tape-applying roll rotatably mounted in a position adjacent the moving web so that a peripheral portion is only partly overlapped by the edge of the web and rotatable against a portion of the web and in the same general direction, a rotatably mounted supply roll for tape, a rotatably driven feed roll positioned to feed tape to a portion of said tape-applying roll which is remote from the web with the adhesive side of the tape facing outwardly, means between said supply roll and said feed roll for folding at least one edge of the tape inwardly against the adhesive side, means for temporarily holding tape fed from said feed roll against the periphery of said tape-applying roll in a position with the folded edge portion facing outwardly and extending circumferentially of the latter roll and in a position where only part of the transverse dimension of the tape on the applying roll will be overlapped by the web with the remaining part adapted to project laterally from the web, means positioned adjacent said tape-applying roll for periodically severing the tape transversely to provide severed strips extending transversely of the periphery of the tape-applying roll and each having an infolded end, means for temporarily holding each severed strip against the roll as it is being moved toward the web, and a control for said holding means operable to release each strip from the roll as the outwardly-facing adhesive unites with the web and with the folded end of the tape facing outwardly of the roll and extending longitudinally of the web.

7. Apparatus for applying spaced strips of closure tape to a moving web as claimed in claim **6** in which the parts are so arranged that the folded end of the strip of tape is overlapped by the web when it is released by the holding means of the tape-applying roll.

8. Apparatus for applying spaced strips of closure tape to a moving web as claimed in claim **6** in which the parts are so arranged that the folded end of the strip of tape is on the part of the strip which is adapted to project laterally from the web.

9. Apparatus for applying spaced strips of closure tape to a moving web as claimed in claim **6** in which the folding means between the supply roll and feed roll serves to fold both edges of the tape inwardly and in which the parts are so arranged that one of said infolded ends of each severed strip is overlapped by the web and the other end is on the portion of the strip which is adapted to project from the web.

10. Apparatus for applying spaced strips of closure tape to a moving web of packaging material comprising: a tape-applying suction roll rotatably mounted in a position adjacent the moving web with a peripheral portion rotatable against a portion of the web and in the same general direction and having cut-strip-holding radial suction ports followed by tape-holding suction ports, one set of ports communicating with one set of axial suction ducts

and the other set with radially-offset axial suction ducts, a driven feed roll for feeding tape to a portion of said tape-applying roll which is remote from the web, means for supplying a continuous length of tape to said feed roll with the adhesive side against the feed roll, a suction header against an end of the suction roll and having radially-offset arcuate suction recess portions, a first portion of said arcuate recess being so positioned in the header that it communicates with axial ducts for the tape-holding suction ports at a time to cause temporary holding of tape fed by the feed roll against the periphery of the tape-applying roll with the adhesive side of the tape facing outwardly, cutting means positioned adjacent the tape-applying roll and arranged to sever the tape between said cut-strip-holding suction ports and trailing tape-holding suction ports to provide severed transverse strips on said periphery, an offset portion of the arcuate recess of the header being positioned so that it communicates with the axial ducts for the cut-strip-holding suction ports to temporarily hold each severed strip against the roll as it is being moved away from the end of the tape and toward

the web, those axial ducts which communicate with said trailing tape-holding suction ports being thereafter moved out of communication with their arcuate suction recess portion so that the suction in said tape-holding suction ports ceases during the portion of their rotation when they are uncovered by tape, and said offset arcuate recess portion for the axial ducts for the cut-strip-holding suction ports being so positioned that suction in said last suction ports is cut off at a time to release each cut-strip from the roll as the outwardly-facing adhesive unites with the web.

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