June 11, 1968 W. A. PEABODY, JR 3,387,429

WEB FEEDING METHOD AND APPARATUS

Filed Aug. 28, 1964

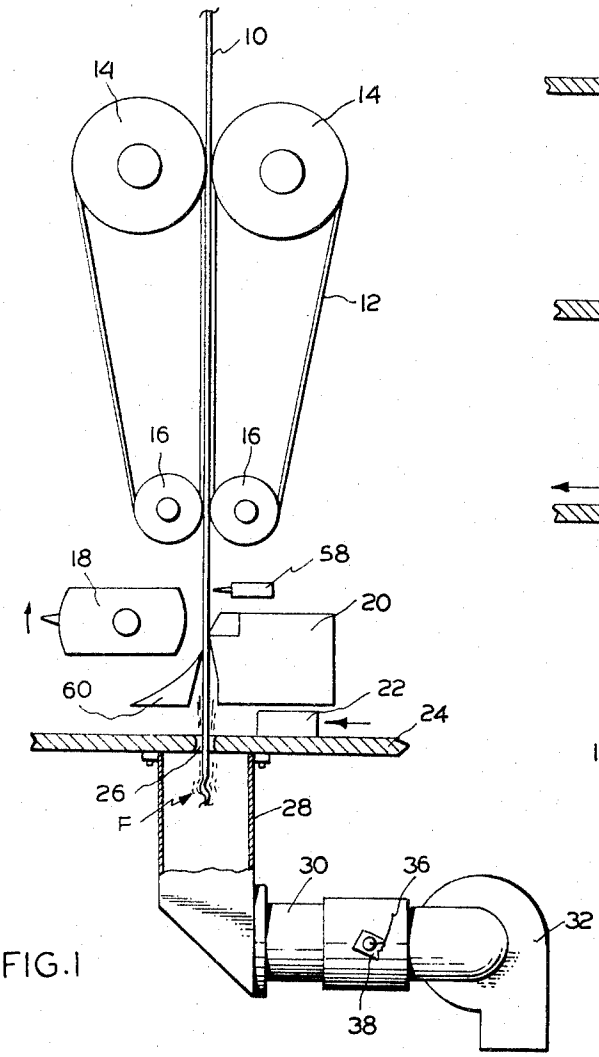


FIG. 1

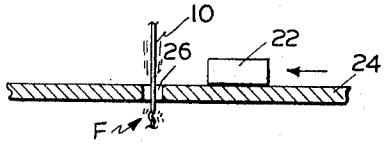


FIG. 4

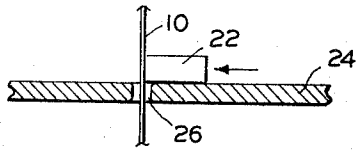


FIG. 5

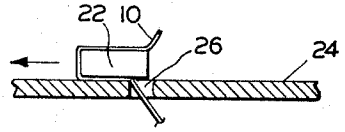


FIG. 6

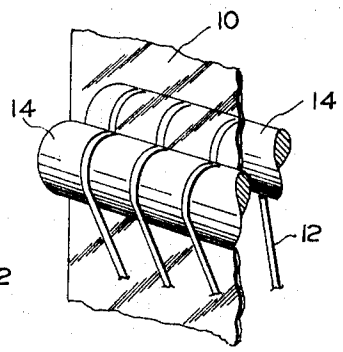


FIG. 3

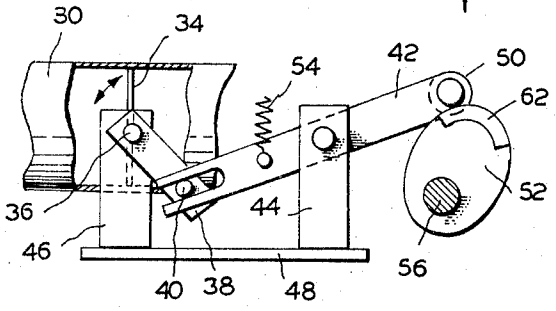


FIG. 2

INVENTOR
WILLIAM A. PEABODY, JR.

BY Glenn, Palmer, & Matthews
ATTORNEYS

United States Patent Office 3,387,429 Patented June 11, 1968

3,387,429

WEB FEEDING METHOD AND APPARATUS

William Alden Peabody, Jr., Henrico County, Va., assignor to Reynolds Metals Company, Richmond, Va., a corporation of Delaware

Filed Aug. 28, 1964, Ser. No. 392,740
7 Claims. (Cl. 53—228)

ABSTRACT OF THE DISCLOSURE

Automatic or semi-automatic machinery for wrapping articles such as cigarette packages in a transparent overwrap. In particular, the invention is directed to the proper feeding of thin gauge, and often flimsy, wrapping material into the path of the articles to be wrapped, and efficiently retaining the same thereat by a subjacent suction device until wrapping commences.

This invention relates to web feeding devices and more particularly to improved methods and apparatus for effectively feeding and guiding very thin and flimsy plastic webs in association with high speed package wrapping machines.

In the wrapping of articles, such as cigarette packages, it is conventional in the industry to feed a relatively thick and stiff web of wrapping material such as Cellophane in a vertical direction downwardly through a web-receiving slot in an article support platform to thereby dispose the web transversely of and in the path of an advancing cigarette package, which latter engages the web above the leading end thereof to effect a U-fold about the package as the package continues its motion, after which further folding and sealing operations take place on the wrapper. One example of such conventional machinery is shown in Forster Patent 2,266,362.

In recent years, there has been a trend away from the use of relatively stiff or thick Cellophane-like material toward less expensive transparent wrapper webs such as polyvinyl chloride (PVC) or polyethylene which in addition to their economic advantages, are heat sealable, heat shrinkable, and have other desirable characteristics. Such materials, however, are quite thin and flimsy in nature, commonly having a thickness on the order of ½ or ¾ mil. As a result, considerable difficulty has been encountered in feeding such webs on conventional high speed wrapping apparatus of the type above briefly referred to. Thus, while Cellophane may be temporarily further stiffened for feeding by imparting a gently vertically corrugated configuration thereto while vertically delivering the same to insure proper straight-line feed thereof, such stiffening as by corrugating cannot be effectively imparted to a fllmsy ½ mil PVC web or the like. Further, in being fed over and through various feeding and cutoff rolls, there is an increased tendency of these extremely thin plastic films to acquire a static charge which causes these lightweight films to depart from their intended feed path and cling to or otherwise become entangled with portions of the machine, necessitating shutdown of the apparatus to correct these difficulties with resultant expense and loss of time.

I have found that with the cooperative association of several novel and improved feeding means that these aforementioned difficulties can be eliminated, whereby such flimsy webs may be readily and speedily fed, and can be readily incorporated into existing apparatus without major modification thereof.

It is therefore an object of this invention to provide improved feeding means for insuring the proper vertical feed of flexible flimsy webs such as ½ or ¾ mil PVC or the like.

It is a further object of the invention to insure that the web will be fed truly vertically and will not become enmeshed with or wrapped around portions of the machine.

It is a further object of my invention to provide novel and simple controlled air flow means to facilitate guidance of the web.

Another object of my invention contemplates the use of the article being wrapped, such as the cigarette package itself, as a valve means to control the air flow at the proper time in a wrapping cycle.

Additionally, it is an object of my invention to provide a simple mechanical air flow valve control means which may be readily incorporated into existing machinery to insure proper feeding of the web without tangling or jamming thereof.

Further objects and advantages of my invention will be apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a diagrammatic side elevation of a preferred form of my invention;

FIG. 2 is an enlarged fragmentary detail of a timing valve employed in the apparatus of FIG. 1;

FIG. 3 is a fragmentary perspective view showing the O-belt feed means for the web;

FIGS. 4, 5 and 6 are fragmentary diagrammatic illustrations of successive stages in the initial wrapping of a package according to my invention.

Referring to the drawings, there is shown at **10** a web of flimsy transparent plastic film such as ½ or ¾ mil thickness polyvinyl chloride (PVC) supplied from a suitable source such as illustrated in the above mentioned Foster patent. The web **10** is fed vertically downwardly by cooperating reaches of O-ring feed belts **12** trained respectively about upper and lower pairs of grooved rollers **14** and **16**, of which one pair is driven by suitable means. The web passes thence between a rotatable knife **18** and cooperating anvil **20** which at timed intervals effect the severance of a length of film from the web for wrapping the package **22**. The package is advanced in conventional fashion in timed relation across a platform **24**, which latter is provided with a transverse slot **26** in alignment with the direction of web feed and through which the leading end of the web is fed. Suitable suction means are provided in communication with the lower end of the slot **26**, including a vertical length of conduit **28** detachably affixed to platform **24** and a horizontal conduit **30** which communicates with a vacuum pump device, such as a blower fan **32**, which is driven in a direction to produce a negative pressure in the conduit sections **28** and **30** resulting in a downward air flow through slot **26**.

In the preferred form of my invention I incorporate a butterfly valve **34**, FIG. 2, in the conduit **30** mounted upon a rotatble shaft **36** journalled therein. A crank arm **38** affixed to shaft **36** is provided at its remote end with a laterally extending stud **40** which is slidably received within the slotted end of a lever **42**. Lever **42** is pivotally mounted upon an arm **44**, which along with conduit support **46** are affixed to a suitable base **48**. The other end of lever **42** carries a cam follower roller **50** which is maintained in rolling engagement with a driven cam **52** by means of tension spring **54** affixed between lever **42** and a frame member of the machine, such as platform **24**. The cam **54** in mounted upon a shaft **56** and is driven by suitable motor means in timed relation with other operations of the web feeding apparatus to effect opening and closing of the butterfly valve **34** in a manner to be hereinafter explained.

A suitable anti-static device **58** of the ionizing needle point type is located between the feed belts **13** and the cutter **18** to minimize the electrostatic charge on the web. The precise location of the anti-static device relative to

the web may be varied for optimum efficiency and more than one device may be used on the machine as desired.

It will thus be seen that the flimsy web 10 is gripped between the confronting runs of the several spaced O-belts 12 and is positively fed downwardly toward the slot 26 between the cutter 18 and anvil 20.

Accordingly, with the valve 34 in substantially open position as the cam follower roller 50 traverses the shorter radius portions of cam 52, suction is drawn through conduits 28 and 30 whereby the resultant air flow above platform 24 insures that the leading end of the web 10 delivered from feed belts 12 will be positively led between cutter and anvil 18, 20 and thence downwardly through the slot 26. A slight flutter or ripple indicated at F, is imparted to the flimsy web by the suction-induced air flow, whereby the plastic film material which is inherently of a somewhat clinging nature will be prevented from attraction and adherence to adjacent portions of the apparatus, such as cutter 18, anvil 20, shoe 60, or the sides of the platform slot 26.

As the leading end of the web 10 initially enters slot 26, the article 22 is being advanced theretoward across platform 24 by conventional means, and the butterfly valve 34 is at this time in open position causing the moving film of air to assist the leading edge of the film to pass downwardly and into slot 26 as seen in FIGS. 1 and 4. As the package 22 approaches and transversely engages the web, as seen in FIG. 5, the high portion 62 of cam 52 elevates cam follower roller 50 to thereby close valve 34, and thus terminating downdraft suction on the film as the package 22 passes from the FIG. 5 to the FIG. 6 position. In the preferred embodiment, it is important that the timing of the valve be such that suction is cut off at this point in the wrapping cycle so as to insure a neat and properly aligned initial U-fold and to prevent excessive flutter of the film as the package passes over slot 26 to engage and carry the film therewith. If the air flow induced film ripple is excessive at this point the film 10 will not necessarily neatly U-fold about the package 22, but will tend to become inturned and underfolded at the edges or corners of the package, and the thus inturned film will tend to remain askew as the package passes between the shoe 60 and the table 24 therebeneath, thereby preventing subsequent proper final folding and wrapping operations.

At the FIG. 6 position, however, just prior to the complete initial U-wrapping of the package and just before knife 18 has severed a package-length sheet from the web 10, cam follower roller 50 rides from the high portion 62 of the cam onto the lower portion thereof to gradually open valve 30 and reestablish suction on the film. Thus, when knife 18 severs a package-length sheet from the web, which occurs at or immediately after the position shown in FIG. 6, the film is again subjected to downdraft suction through slot 26, thereby insuring that the newly formed leading edge of the web 10 will be led downwardly toward the slot and will not tend to adhere in clinging electrostatic contact with revolving knife blade 18 or cling to other adjacent members.

Accordingly, it will be seen that the downdraft suction is maintained through slot 26 for a major part of the interval between two successive package wrapping operations and indeed about 75% of the time interval therebetween, and constitutes a principal and novel, yet mechanically simple, means of successfully effecting wrapping operations with hitherto virtually unworkable flimsy films.

With the apparatus just described, I have found that conventional packaging machinery available on the market, such as the Scandia Model 708 Cigarette wrapping machine, as modified in accordance with the teachings of my invention, is capable of feeding flimsy plastic films of extreme thinness such as ½ mil solution cast biaxially oriented PVC or the slightly thicker ¾ mil PVC at normal full operative speeds of the machine on the order of 180 packages per minute commonly employed with conventional Cellophane overwrap webs, without jam-ups or misfeeding due to the previous inability of these extremely light gauge flimsy materials to feed reliably in a vertically downward direction.

Indeed, while in the preferred embodiment of the invention I have shown the suction conduit and blower as including a cyclically operated timing means including butterfly valve 34, I have found that flimsy webs may be reasonably successfully fed even without a separate mechanically operated suction control valve. In this latter instance, the passage of the package 22 over slot 26 effectively serves to valve the downdraft air flow, inasmuch as the package 22 fully blocks slot 26 in passing thereover except for the extreme transverse side edges thereof, wherein the package itself thus acts as a valve in carrying out the purposes of my invention. In such instances, it is preferable to employ a plurality of antistatic devices 58 to minimize electrostatic attraction, and to operate the vacuum blower at a slightly lower speed to minimize edge flutter of the web. Thus as the package 22 arrives at the position of FIG. 5, the slot 26 is already partially blocked, and as the package passes from the FIG. 5 to the FIG. 6 position, the slot is almost fully blocked permitting the film material to wrap about the package without excessive tendency for the now severed film length to be sucked into conduit 28. As the U-wrapped package commences leaving the area of the slot 26 as seen in FIG. 6, and the trailing end of the package fully reopens the slot, the full downdraft suction will be re-established, thereby insuring that the newly formed leading edge of the film following severance thereof by knife 18 will be properly fed down into and through the slot prior to arrival of the next package.

While I have shown in FIG. 1 the use of two confronting arrays of O-belts 12 for feeding the film, the same are not strictly necessary except that quite thin and flimsy films such as ½ mil PVC. For slightly thicker films such as ¾ mil PVC, although still substantially thinner than conventional Cellophane, a single series of O-belts 12 is all that is strictly necessary, and the material can be fed thereby in cooperation with conventional pleater means in lieu of a corresponding set of O-belts.

I claim:

1. In a web feeding device for a wrapping machine, including,

conveying means for vertically feeding a web,

cutoff means disposed beneath said conveying means for severing a package length sheet from said web,

platform means spaced beneath said cutoff means over which an article to be wrapped is advanced, said platform having a transverse slot disposed in the web feed path and through which the leading end of said web passes,

and means for advancing said article over said platform in timed relation to said conveying and cutoff means to cause said article to engage said web at said slot above the leading edge thereof thereby to U-fold a severed sheet length of said web about said article,

the improvement therein for feeding webs of thin and flimsy material, comprising

suction means cooperatively associated with said transverse slot therebeneath for creating a downdraft therethrough for guiding the leading edge of a flimsy web theretoward, and for imparting flutter to said web to prevent clinging adherence of said web to adjacent portions of said device.

2. The device of claim 1 further including a valve for controlling said suction means, and means for operating said valve in timed relation to said article-advancing and cutoff means to terminate said downdraft substantially while said article advances across said slot and to reestablish said downdraft prior to web severance.

3. The device of claim 1 wherein said suction means includes a conduit communicating at one end with said

slot and at its other end with a suction-producing means, said conduit having therein between the ends thereof a valve for controlling the downdraft suction present at said slot,

and cam means for operating said valve in timed relation with said article-advancing and cutoff means.

4. The device of claim 3 wherein said cam means effects closing of said valve to terminate said downdraft suction as said article advances over said slot into contact with said web, and said cam means effects opening of said valve as the trailing edge of said package passes over said slot and immediately prior to the time said cutoff means severs a sheet from said web, whereby excessive suction-induced flutter as said article passes over said slot is prevented and said downdraft suction is reestablished to positively guide the newly formed web end to said slot.

5. Apparatus for feeding a flimsy web in a wrapping machine, comprising,

conveying means for feeding the web downwardly in a vertical path,

cutoff means disposed below said conveying means for severing a wrapper sheet from said web,

a platform disposed beneath said severing means in spaced relation thereto for receiving articles to be wrapped, said platform having a transverse slot therein aligned with said web path,

and means for creating a downdraft air flow through said slot for guiding the free end of said web theretoward to thereby dispose said web in the path of an article on said platform to be wrapped.

6. The device of claim 5 wherein said conveying means comprises a plurality of pairs of endless belts, each said pair thereof having adjacent cooperating reaches between which said flimsy web is gripped and fed along said vertical path.

7. Apparatus for feeding a flimsy web in a wrapping machine, comprising,

conveying means for feeding the web downwardly in a vertical path,

cutoff metans disposed below said conveying means for severing a package sheet from said web,

a platform disposed beneath said severing means in spaced relation thereto for receiving articles to be wrapped, said platform having a transverse slot therein aligned with said web path,

means for creating a downdraft air flow through said slot for guiding the free end of said web theretoward to thereby dispose said web in the path of an article to be wrapped and to impart flutter to said web to prevent clinging thereof to said apparatus,

means for successively advancing articles across said platform, over said slot and into said web transversely thereof to cause said web to U-fold about an advancing article,

and means for operating said cutoff and advancing means in timed relation to cause said cutoff means to sever a sheet from said web subsequent to passage of the leading end of said article over said slot to thereby prevent said downdraft air flow from drawing said severed sheet through said slot.

References Cited

UNITED STATES PATENTS

1,847,915	3/1932	Bailey	271—74 X
3,274,870	9/1966	Schmermund	83—100 X
3,277,630	10/1966	Youngman et al.	53—389
3,307,327	3/1967	Liedtke	53—230

FOREIGN PATENTS

923,002	4/1963	Great Britain.

WILLIAM W. DYER, JR., *Primary Examiner.*

N. ABRAMS, *Assistant Examiner.*