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Monaghan

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[54] **PACKAGING MACHINE AND PROCESS**

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[51] **Int. Cl.**... **B65b 11/12**, B65b 41/12, B65b 49/16

[58] **Field of Search** 53/3, 196, 209, 210, 389

[56] **References Cited**

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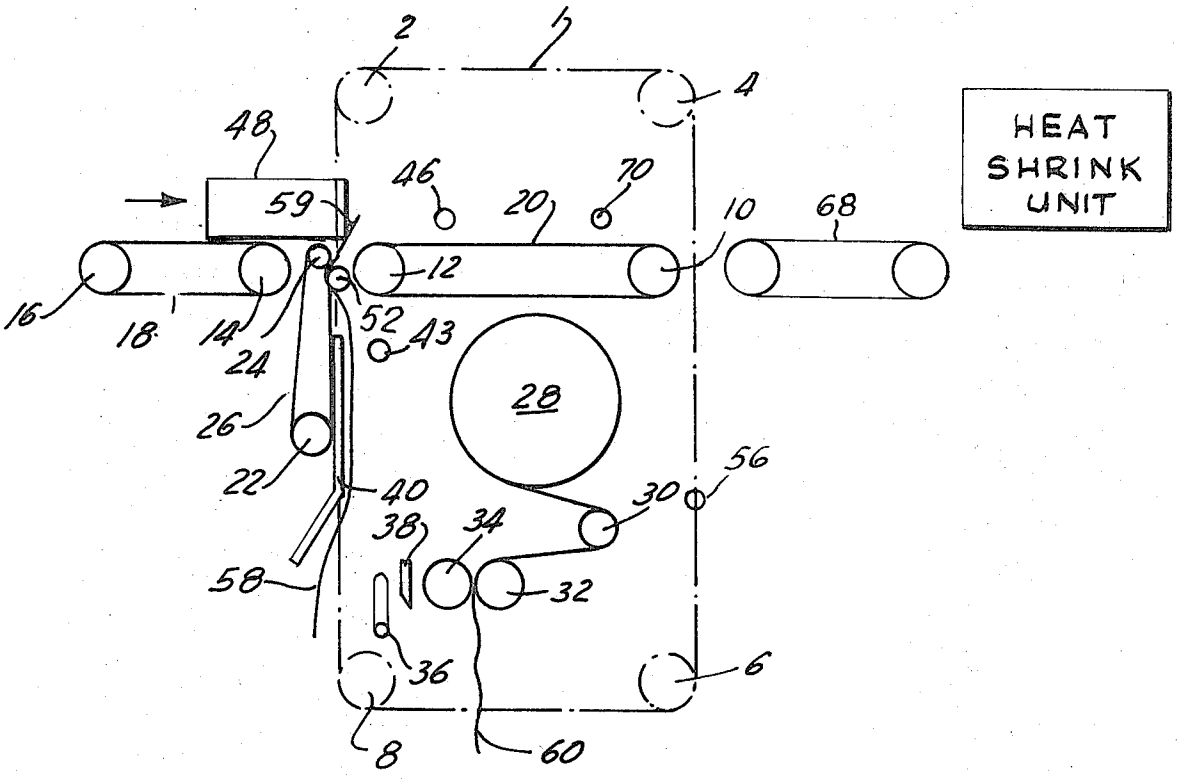
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Assistant Examiner—Neil Abrams
Attorney, Agent, or Firm—Cooper, Dunham, Clark, Griffin & Moran

[57] **ABSTRACT**

This invention relates to a bundling process and apparatus using a conveying system in which the leading end of a predimensioned sheet of wrapping material is advanced with the aid of an air jet to the input end of a conveyor, and supported by the air jet to lie in the path of an incoming article to be wrapped. The article supplied to the conveyor contacts, and proceeds to rest upon, the leading end of the sheet, and a wrapping bar then travels around the article carrying the trailing end of the sheet to form a sleeve around the article. This sleeve wrap is then completed by passing the article from the conveyor to another surface, causing the trailing end of the wrapper sheet to overlap the leading end underneath the article, and the overlapped ends are then heat sealed and the wrapping material heat shrunk to form a tight sleeve wrap.

4 Claims, 2 Drawing Figures



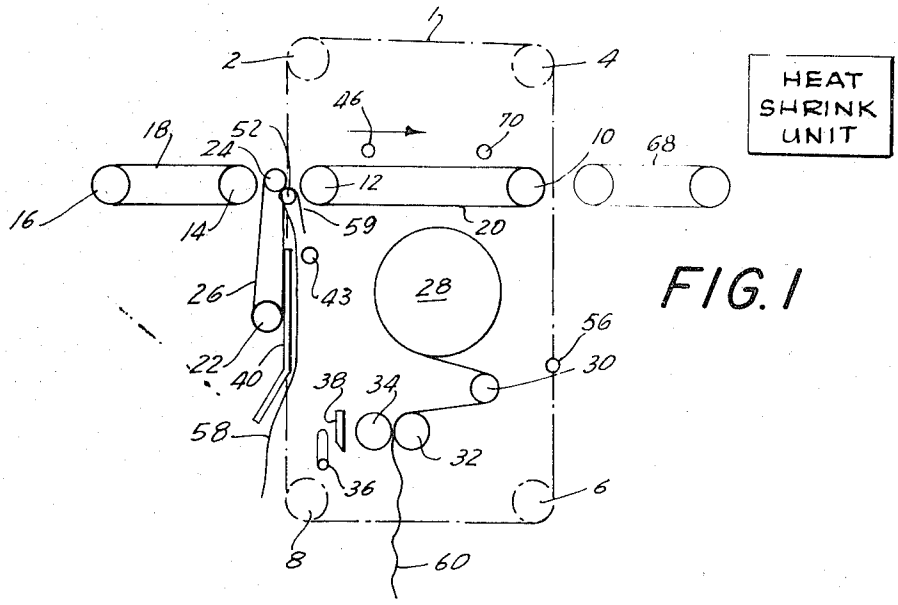


FIG. 1

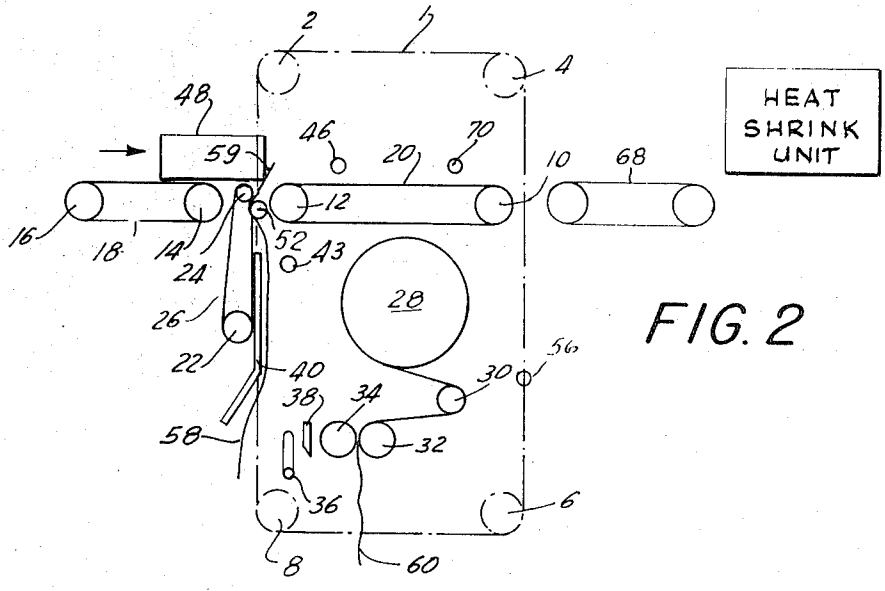


FIG. 2

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PACKAGING MACHINE AND PROCESS

BACKGROUND AND BRIEF STATEMENT OF THE INVENTION

The apparatus and process utilized in this invention are more fully described in applicant's copending application Ser. No. 112,616, filed Feb. 4, 1971, the content of which is incorporated herein by reference.

The packaging process apparatus of this invention is directed to a wrapping concept where an article, or a plurality of articles, is conveyed on a wrapping conveyor to a predetermined location in a wrapping zone, stops, a predimensioned strip of film is then carried completely around the article and over the output end of the wrapping conveyor, and the enwrapped article is then conveyed to a finishing zone to complete an overlapped sleeve about the article, as it is being conveyed out of the wrapping zone, and to seal and shrink the enwrapping material in the finishing zone to form the finished package.

Briefly, the process of the invention comprises the steps of cutting a strip of wrapping material from a continuous roll centrally mounted within a path of the wrap bar, advancing the leading end of the cut strip to the end of a conveyor with the aid of an air jet, the air jet also acting to support the leading end across the path of an incoming article to be wrapped, conveying the article to be wrapped, along a path to intersect the leading end of the strip and press it down against the conveyor, advancing the article forward to be fully on the conveyor with its rearward half or so resting on the leading end of the strip, whereupon the conveyor stops, and passing the wrap bar around the conveyor to carry the trailing end of the strip completely around the article and over the output end of the conveyor. Further, the article is then advanced on the conveyor to another surface, so that the then leading end of the wrapping material overlaps the end underneath the article to form a complete sleeve wrap around the article, to be packaged in a wrapping zone and this overlapped material is then sealed and the enwrapping material shrunk in a finishing zone to form a tight sleeve wrap.

The article is conveyed to the wrapping zone by conveying means which normally comprise an endless belt mechanism, through the packaging zone by an endless belt conveying means, and then to and through the finishing zone by an endless belt conveying means. Also, while the article is being advanced to be fully within the wrapping zone, with the leading end of the wrapping strip beneath it, the trailing end of the strip is simultaneously advanced by a film-advance endless belt conveyor, so that it can move with the article.

Thereafter, while the article is stationary within the wrapping zone, the trailing end of the strip of wrapping material is carried substantially completely around the article by a wrapping bar operated by means of a pair of opposed endless belts, cooperating with a driving roller and a plurality of idler rollers, arranged in the wrapping zone to permit the complete enwrapment of the article.

SPECIFIC DESCRIPTION OF THE INVENTION

The invention involving the positioning of the film under the package is hereinafter specifically described in the following specification taken in conjunction with the drawings, in which

FIG. 1 is a schematic diagram of the apparatus of the present invention showing the position of the film prior to the entry of the article to be enwrapped into the wrapping area; and

FIG. 2 shows the position of the film as the package proceeds into the wrapping area to contact an end of the film.

Referring to the drawings, the means utilized for feeding the film are as follows:

Endless belts 1 are driven by rollers 2, 4, 6 and 8 in a conventional manner. A conveyor system is provided which comprises a driving roller 10 and an idler tensioning roller 12 carrying an endless belt 20. This conveyor can be designated a wrapping conveyor since it is located within the wrapping area or zone of the apparatus, and most of the wrapping operation takes place while the article is located on this conveyor. Feeding the article onto the conveyor 20 is a conveyor system having driving roller 14, idler roller 16 and an endless belt 18. An open space exists between the driving roller 14 and the feeding conveyor and idler roller 12 of the wrapping conveyor. Disposed in this space is a film feeding conveyor having driving roller 22, idler roller 24 and endless belt 26.

To feed the film to the input end of the wrapping conveyor, from the film feed roll 28, there is provided an idler roller 30 and film feed rolls 32 and 34. A pivotable film deflector bar 36 is disposed to operate together with a film cutoff 38 which, as shown, is in the form of a cutting blade.

Operating together with the film feed belt 26 is a pressure plate 40 which assists in cutting the film and advancing a dimensioned length of film to a ready position for wrapping an article, as will be explained. In accordance with the present invention an air pressure pipe 43 provided with air vents is disposed below the opening existing between driving roller 14 and idler roller 12. The air vents are positioned in a direction to blow the film 59 into the path of an incoming article, at a point adjacent the idler roller 12, as shown in FIG. 2 and as hereinafter described.

A photoelectric cell 46, properly connected to a power source, is provided in the apparatus slightly above the upper stretch of the wrapping conveyor 20 such that the receipt of an article 48 at this photocell will actuate film feeding conveyor 26 to advance the film with the package. Also, a second photoelectric cell 70 is provided to interrupt the rotation of the wrapping conveyor 20, and film feeding conveyor 26 once this article reaches the photocell.

The pair of endless belts represented in the figures by reference numeral 1, are spanned by first and second wrapping bars 52 and 56. Both of these wrapping bars are rotatably mounted on rollers, to rotate about their own axes, as well as to advance with the wrapping conveyor 20 along the path defined by the endless belts 1.

The operation of the apparatus, including the air jet feature of the present invention, is shown in FIGS. 1 and 2. A dimensioned film, that is a strip of film of the proper width which is cut for the article to be enwrapped, is shown as 58. The manner of cutting this film is explained in the above-mentioned application, Ser. No. 112,616. Briefly, it involves advancing the film from the supply roll 28 into the path of the wrap bars, by the film feed rollers 32 and 34, such as shown by film 60 in FIG. 1. Then, as the wrap bars advance, bar 52 picks up the film and carries it forward. When wrap

bar 52 reaches the lower end of pressure plate 40, it presses the film against this plate, and then rolls up the plate, to exert a tension on the end of the film, which is still attached to the supply roll 28. The effect of this is to lift the weight 36, rotating it about its axis, to expose the cutoff blade 38 and cut the film. This rolling action of wrap bar 52, up the pressure plate 40, and then along the surface of the stationary conveyor belt 26, has the effect of maintaining constant control over the film to bring one end thereof (which was initially the trailing end) up to the input end of the wrapper conveyor 20, as shown in FIG. 1. Thus prior to the entry of the article, the film is cut or predimensioned and the upper edge 59 of the predimensioned film 58 is brought by the wrap bar 52 into the position shown in FIG. 1. At this time the motion of the wrap bar 52 is stopped and a blast of air is interjected into the air pipe 43 and out the vents to blow the upper edge of the film 59 into the position shown in FIG. 2. Once in this position, as the package 48 enters, the end 59 of the film is caught between the under surface of the package 48 and the upper surface of the endless belt 20. Also, once the package reaches photocell 46, the film feeding conveyor 26 is actuated to rotate against roller 52, thus to advance the film so that it will be carried forward by the weight of the package, while the wrap bars 52 and 56 and the associated pair of endless belts 1 are stationary.

When the package 48 reaches the photoelectric cell 70, wrapping conveyor 20 and film feeding conveyor 26 stop and driving roller 6 is activated to drive the opposed endless belts 1 and the associated wrap bars 52 and 56 one-half revolution in a clockwise direction. The trailing end of film 58 is thus carried by wrap for 52 up along the trailing edge of package 48, then over the top of the package, and down in front of the package and the output end of conveyor 20. The end 59 of film 58, which is secured beneath the surface of package 48, now becomes the trailing edge of the film, while the end moved by the wrapping bar 52 becomes the leading edge.

It will be understood that the air blast through the vents of the air pipe 43 is operated intermittently, and only when the film is in the position shown in FIG. 1. In this manner, the use of the air jet ensures that the film will always accurately be placed to intercept the incoming article and achieve an effective enwrapment of each package.

As explained in my application Ser. No112,616, as the endless belt 1 completes a half-revolution, with the relative positions of wrap bars 52 and 56 reversed from that shown in FIG. 1, a timing mechanism stops the rotation of the endless belt 1 and actuates conveyor 20. Package 48 thus moves to the right onto the surface of an endless belt 68, which is spaced a short distance from drive roller 10, so that the leading edge of film 58 is trapped by the package 48 against the upper stretch of endless belt 68, and the continued movement of package 48 thus wraps the two ends of film 58 around the package. Further, the now completely enwrapped package then passes to means for sealing the overlap and heat shrinking the enwrapping film about the package.

During this half-revolution of the wrap bars, during which wrap bar 52 effects a sleeve wrap about the article 48, the second wrap bar 56 makes a half-revolution to reach the position occupied by wrap bar 52 in FIGS. 1 and 2, and in doing so, it picks up the next length of film, presses it against the pressure plate 40 and stationary belt 26, in the manner already explained, to cut off a predetermined length of film and advance this length of film to a ready position with the aid of the air jets from pipe 43.

Thus, the cycle has been completed and the new length of film can now be wrapped about a new article to be wrapped.

What is claimed is:

1. Automatic packaging apparatus comprising

a wrapping conveyor having an input and an output end for conveying successive articles to be wrapped,

package receiving means adjacent the output end of said wrapping conveyor but spaced therefrom,

carrier means carrying at least one wrap bar along a path which encircles said wrapping conveyor to wrap plastic wrapping film about an article on said conveyor,

plastic wrapping film supply means located at a level below said wrapping conveyor,

wrapper feeding means independent of said wrapping conveyor for lifting the leading end of a length of the plastic wrapping film to a predetermined location adjacent the input end of said wrapping conveyor,

said wrapper feeding means including means to pick up the wrapping film at a point spaced from the input end of said wrapping conveyor and to invert the film from its initial condition so that its initially trailing end becomes its leading end,

means producing an upward air jet adjacent the input end of said wrapping conveyor to lift the inverted trailing end of the wrapping film, which has become the leading end, to a position above and spaced from the upper surface of said wrapping conveyor, and to maintain such leading end projecting upwardly above said upper surface to intercept the unobstructed path of an incoming article to said wrapping conveyor,

article feeding means for passing an article to be wrapped into contact with the leading end of the wrapping film and then onto the input end of said wrapping conveyor, to restrain the originally upwardly projecting leading end of the wrapping film between the bottom surface of the article and the upper surface of the wrapping conveyor,

drive means for advancing the wrap bar along its path and against the trailing end of the wrapping film, while the article is on the wrapping conveyor with at least part thereof resting on the leading end of the wrapping film, to convey the trailing end thereof up over the article and down in front of it to the output end of said wrapping conveyor, and

means for passing said article onto said package receiving means after said wrapping film has been so conveyed about the article to cause the trailing end of said wrapping film to overlap the leading end thereof underneath the article.

2. Automatic packaging apparatus comprising

a wrapping conveyor having an input and an output end for conveying successive articles to be wrapped,

package receiving means adjacent the output end of said wrapping conveyor but spaced therefrom,

carrier means carrying at least one wrap bar along a path which encircles said wrapping conveyor to wrap plastic wrapping film about an article on said conveyor,

plastic wrapping film supply means located at a level below said wrapping conveyor,

wrapper feeding means independent of said wrapping conveyor for conveying a first length of said wrapping film to said wrapping conveyor and lifting the leading end of a said first length of the plastic wrapping film to a predetermined location above the wrapping conveyor adjacent its input end,

said wrapper feeding means including airjet means producing an upward air jet adjacent the input end of said wrapping conveyor, effective before said wrapping film reaches said wrapping conveyor, to lift the leading end of the wrapping film from a position below to a position above, and spaced from, the upper surface of said wrapping conveyor, and to maintain such leading end projecting upwardly above said upper surface to intercept the incoming article to said wrapping conveyor,

said wrapper feeding means also including means for holding said wrapping film to extend across the path of the wrap bar, wherein this extended film is picked up and carried by the wrap bar toward the input end of the wrapping conveyor, as the wrap bar passes along its path, to feed one end of said wrapping film into the path of the air jet,

article feeding means for passing the front edge of a first article to be wrapped into contact with the leading end of the wrapping film and then past said leading end onto the input end of said wrapping conveyor, to restrain the originally upwardly projecting leading end of the wrapping film between the bottom surface of the article and the upper surface of the wrapping conveyor, rearwardly of the front edge of said article,

drive means for advancing the wrap bar along its path and against the trailing end of the wrapping film, while said first article is on the wrapping conveyor with at least part thereof resting on the leading end of the wrapping film, to convey the trailing end of said film up and over said article and down in front of it to the output end of said wrapping conveyor,

said wrapper feeding means being synchronized with said wrap bar for supplying a second length of wrapping material and advancing the leading end thereof to the input end of said conveyor while said wrap bar is conveying the trailing end of the first length up and over and down in front of the said first article, and

means for passing said first article onto said package receiving means after said wrapping film has been so conveyed about said article to cause the trailing end of said wrapping film to overlap the leading end thereof underneath the article.

3. Automatic packaging apparatus comprising

a wrapping conveyor having an input and an output end for conveying successive articles to be wrapped,

package receiving means adjacent the output end of said wrapping conveyor but spaced therefrom,

carrier means carrying at least one wrap bar along a path which encircles said wrapping conveyor to wrap plastic wrapping film about an article on said conveyor, the wrap bar being circular in cross-section and rotatable about its own axis,

plastic wrapping film supply means located at a level below said wrapping conveyor,

wrapper feeding means independent of said wrapping conveyor for lifting the leading end of a length of the plastic wrapping film to a predetermined location adjacent the input end of said wrapping conveyor,

means producing an upward air jet adjacent the input end of said wrapping conveyor to lift the leading end of the wrapping film to a position above and spaced from the upper surface of said wrapping conveyor, and to maintain such leading end projecting upwardly above said upper surface to intercept the unobstructed path of an incoming article to said wrapping conveyor,

cut-off means and means providing a surface adjacent the wrap bar path near the input end of the wrapping conveyor,

said wrapper feeding means including means for holding said wrapping film to extend across the path of the wrap bar, wherein this extended film is picked up and carried by the wrap bar toward the input end of the wrapping conveyor, as the wrap bar passes along its path, the wrap bar pressing against and rotating along said surface, with the wrapping film between it and said surface, to tension the wrapping film against said cut-off means to cut off a sheet thereof of predetermined length, as the wrapping film is being carried by the wrap bar, and to advance one end of the sheet toward the input end of the wrapping conveyor into the path of the air jet,

article feeding means for passing an article to be wrapped into contact with the leading end of the wrapping film and then onto the input end of said wrapping conveyor, to restrain the originally upwardly projecting leading end of the wrapping film between the bottom surface of the article and the upper surface of the wrapping conveyor,

drive means for advancing the wrap bar along its path and against the trailing end of the wrapping film, while the article is on the wrapping conveyor with at least part thereof resting on the leading end of the wrapping film, to convey the trailing end thereof up over the article and down in front of it to the output end of said wrapping conveyor, and

means for passing said article onto said package receiving means after said wrapping film has been so conveyed about the article to cause the trailing end of said wrapping film to overlap the leading end thereof underneath the article.

4. Automatic packaging apparatus comprising

a wrapping conveyor having an input and an output end for conveying successive articles to be wrapped,

package receiving means adjacent the output end of said wrapping conveyor but spaced therefrom,

carrier means carrying at least one wrap bar along a path which encircles said wrapping conveyor to wrap plastic wrapping film about an article on said conveyor,

wrapper feeding means for supplying the leading end of a length of the wrapping film to a predetermined location adjacent the input end of said wrapping conveyor,

said wrapper feeding means including means for holding said wrapping film to extend across the path of the wrap bar, and means for advancing the wrap bar into the extended wrapping film to pick it up and carry it on the wrap bar as it passes along its path to said predetermined location,

intermittently operating means actuated once said wrapping material has reached said predetermined location for producing an upward air jet adjacent the input end of the wrapping material to lift the leading end of the wrapping film and maintain it projecting upwardly above said wrapping conveyor in a position to intersect the path of an incoming article to said wrapping conveyor,

article feeding means for passing an article to be wrapped into contact with the upwradly projecting leading end of the wrapping film and then onto the input end of said wrapping conveyor, to restrain the originally upwardly projecting leading end of the wrapping film between the bottom surface of the article and the upper surface of the wrapping conveyor,

drive means for advancing the wrap bar along its path and against the trailing end of the wrapping film, while the article is on the wrapping conveyor with at least part thereof resting on the leading end of the wrapping film, to convey the trailing end thereof up over the article and down in front of it to the output end of said wrapping conconveyor, and

means for passing said article onto said package receiving means after said wrapping film has been so conveyed about the article to cause the trailing end of said wrapping film to overlap the leading end thereof underneath the article.

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