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WRAPPING MACHINE

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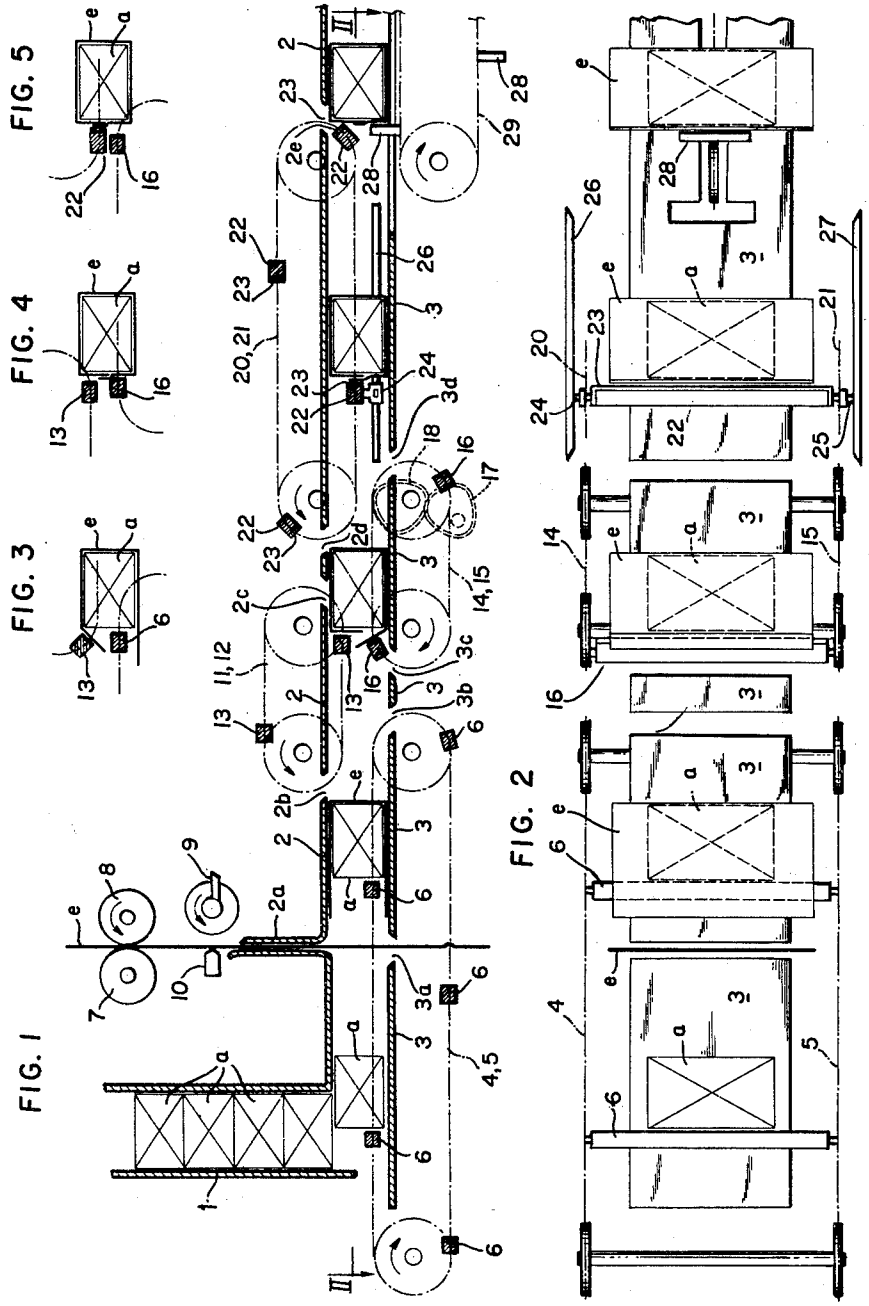


FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

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WRAPPING MACHINE

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This invention relates to wrapping machines. More particularly, this invention relates to an apparatus for wrapping objects or articles, which apparatus may be operated continuously and at high operating speeds. The apparatus is designed particularly for the application of wrappers which surround the article or object like a hull or tube and is especially suited for the wrapping of block-shaped articles.

Prior to my invention, machines of this type which were known were of expensive construction and complicated performance. In one form of prior wrapping apparatus, the hull or tube-like shape of wrapper for a block-shaped object is achieved by overlapping the ends of the wrapper on the bottom surface thereof. The object to be wrapped is pushed against a length of wrapping material by a conveyor in such a way that the wrapping material is placed around the leading side of the object in a U-shaped form. The shank of the U-shaped wrapper which extends along the bottom side of the object covers only a portion thereof. The shank of the wrapper which covers the top side of the object is of substantially greater length and initially projects far beyond the back surface. Thereafter a second conveyor is provided which includes pusher bars to convey the objects through the machine, the pusher bars being adapted to initially cause a portion of the projecting longer shank to cover the trailing surface of the object before making contact therewith, still leaving a portion of material to be pulled along behind the pusher bar. A folding apparatus places this final portion of the longer shank around the bottom rear edge of the object and brings it into contact with the bottom surface thereof which has been partly covered by the shorter shank of the wrapper as described above. This shorter shank is turned away from the bottom surface and thereafter again brought into contact therewith in an overlapping relation to the folded final portion of the longer shank. As is readily apparent, the construction of the above described wrapping apparatus is expensive and the operation complicated.

In another form of prior art wrapping machines, the wrapper is placed in a U-shaped form around three sides of the object while the object is being conveyed through the machine. In this instance, the two shanks of the U-shaped conformation are of substantially equal length and project beyond the trailing surface of the object. However, the folding and overlapping of the shanks on the back surface must be performed after the object has been brought to a halt. This is done by the means of folders which slide to and fro across the top and bottom rearward edges of the object. Again, the construction of the wrapping and folding apparatus is expensive and the wrapping operation may not be performed in a continuous manner.

It is therefore an object of this invention to provide a wrapping apparatus which may be operated continuously.

It is another object of this invention to provide such an apparatus of simple construction.

It is still another object of this invention to provide such an apparatus which permits higher operating speeds.

It is a further object of this invention to provide such an apparatus especially suited for wrapping block-shaped articles.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description, while indicating preferred embodiments of the invention, is given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

It has now been found that the above objects may be attained by the use of my wrapping machine, the characteristic features of which are as follows:

(1) The articles to be wrapped are continuously conveyed along a straight line conveyor system.

(2) The conveyor system comprises a guide means and a combination of at least three endless conveyor means which are arranged one after another and coact with each other to move the article to be wrapped along said guide means.

(3) Each of the endless conveyor means comprises a pair of endless belts provided with a plurality of spaced pusher bars or flights in fixed engagement therewith.

(4) At least one reach of each of the endless conveyor means is adapted to push the article along the straight-line path of the guide means.

(5) In at least one of the endless conveyor means the pusher bars may be modified to seal the wrapped article.

(6) At least one of the endless conveyor means may be modified to operate at varying speeds.

The aforementioned and other objects of this invention and the characteristic features thereof will be fully understood from the following detailed description of a preferred form and application of the invention, throughout which description reference is made to the accompanying drawing in which:

FIGURE 1 is a longitudinal vertical sectional view, partly schematic of an apparatus for carrying out the wrapping procedure in accordance with my invention;

FIGURE 2 is a view taken substantially along line II—II of FIGURE 1; and

FIGURES 3–5 illustrate individual views of certain portions of the wrapping procedure as carried out by the apparatus of FIGURES 1 and 2.

Reference is now made to the drawing and specifically to FIGURES 1 and 2 wherein there is shown one embodiment of the apparatus of this invention. Objects or articles *a* to be wrapped are delivered from stacking means **1** and conveyed between upper guide means **2** and lower guide means **3**. Guide means **2** and **3** each comprise a plurality of plates in a substantially horizontally straight line relation. The plates of each guide means are spaced from one another to provide openings therebetween at certain intervals more fully described hereinafter. The articles *a* are moved away from stacking means **1** and between guide means **2** and **3** by a system comprising a plurality of conveyor means which coact with one another to both move articles *a* and provide them with a tube-like wrap. The first of said conveyor means is preferably positioned generally below lower guide means **3** and comprises a pair of endless belts **4** and **5** provided with a plurality of pusher bars **6** suspended therebetween and in spaced relation to one another. The upper reach of the first conveyor means runs substantially horizontally at an elevation just above guide means **3** and subsequently passes through opening **3***b* therein.

Positioned above the first conveyor means is a wrapping material feed apparatus comprising rollers **7** and **8** which feed wrapping material *e* through upturned spaced flanges **2***a* of upper guide plate **2**. The wrapping material passes through the throat of the upturned flanges **2***a* and through opening **3***a* in lower guide plate **3**, thereby being sus-

pended across the path of travel of articles *a* and transverse to the direction thereof. The wrapping material is cut to the proper length by a cutting means, positioned between rollers **7** and **8** and flanges **2***a*, and comprising a rotating cutting knife **9** and fixed knife **10**.

As the articles *a* approach the end of the first conveyor means, movement thereof is taken over by a second conveyor means which is preferably positioned generally above upper guide means **2**. The second conveyor means comprises endless conveyor belts **11** and **12** having a plurality of pusher bars **13** suspended therebetween and in spaced relation to one another. The lower reach of the second conveyor means passes through openings **2***b* and **2***c* and runs substantially horizontally at an elevation just below upper guide means **2**. Similarly, adjacent the end of the second conveyor means, movement of articles *a* is provided by a third conveyor means preferably positioned generally below lower guide means **3** and comprising a pair of endless conveyor belts **14** and **15** having a plurality of spaced pusher bars **16** extending therebetween. The upper reach of the third conveyor means passes through openings **3***c* and **3***d* and runs substantially horizontally at an elevation just above lower guide means **3**. The third conveyor means is provided with an eliptical gear mechanism which comprises eccentric drive gear **17** and eccentric driven gear **18**. Drive gear **17** is rotated by a suitable source of power (not shown) and in turn causes driven gear **18** to rotate and thereby rotate the third endless conveyor means. Gears **17** and **18** are arranged such that as one of the pusher bars **16** passes through opening **3***c* the speed of the third conveyor means is increased to a speed greater than the speed of the pusher bar **13** of the second conveyor means. As the pusher bar **16** continues its run along the upper reach, its speed decreases as will hereinafter be discussed.

When wrapping material *e* is heat sealable, pusher bars **16** may be modified to act as heating elements to seal the wrapping material about articles *a*. However, in the embodiment shown in the drawing a fourth conveyor means is provided for this purpose and is preferably positioned generally above upper guide means **2**. The conveyor means comprises a pair of endless belts **20** and **21** having a plurality of spaced pusher bars **22** extending therebetween. The lower reach of the conveyor means passes through openings **2***d* and **2***e* and travels substantially horizontally at an elevation just below guide means **2**. The leading surfaces of pusher bars **22** have attached thereto heating bands **23** which are provided with electrical current or current impulses while moving through a predetermined length of the conveyor course. For this purpose, as best seen in FIGURE 2, the ends of heating bands **23** are connected to carbon brushes **24** and **25** which during a portion of their circuit contact current feed rails **26** and **27**.

A final conveyor means, not a part of this invention, is provided at the end of the fourth conveyor means, and comprises a conveyor belt **29** provided with pusher elements **28** which feed the articles *a* into apparatus not shown for further handling as may be necessary. It is to be understood that each of the endless conveyor means hereinbefore described is rotated in the direction of the arrows in FIGURE 1 by suitable sources of power not shown.

In operation, an individual article to be wrapped is lowered onto lower guide means **3** from stacking means **1**. One of the pusher bars **6** engages the trailing surface of article *a* and conveys the same between lower guide means **3** and upper guide means **2**. In the course of this conveyance, the leading surface of article *a* engages wrapping material *e* which is suspended transversely across the path thereof. As movement of article *a* continues, wrapping material *e* covers the leading top and bottom surfaces thereof in a U-shaped form, the ends of the two U shanks trailing behind the trailing surface of article *a*. As the article approaches the end of the first conveyor means, pusher bar **13** of the second conveyor means passes through opening **2***b*, folds down the upper U shank of wrapper material *e* and tightly engages it with the trailing surface of the article as best seen in FIGURE 3. Pusher bar **13** then continues the forward movement of the article toward the end of the second conveyor means. At this point, pusher bar **16** passes through opening **3***c*, folds up the lower U shank of wrapper *e* to tightly overlap the upper U shank already in place, as shown in FIGURE 4. Pusher bar **16** now takes over conveyance of article *a*, and since the speed of pusher bar **16** is greater than that of pusher bar **13**, the wrapped article is pushed out of contact with bar **13** before the same swings through opening **2***c* in its path of rotation, as seen in FIGURE 4. This prevents pusher bar **13** from accidentally displacing the upper U shank of wrapper *e*. As article *a* approaches the end of the third conveyor means, forward movement is provided by pusher bar **22**. When the pusher bar **16** reaches the position where the article is about to be engaged by the pusher bar **22** of the fourth conveyor means the speed of pusher bar **16** has been decreased so that it is traveling at a linear speed less than the speed of the pusher bar **22**. Therefore, article *a* is pushed out of contact of pusher bar **16** by pusher bar **22** and prevents accidental displacement of the lower U shank, as best seen in FIGURE 5. As carbon brushes **24** and **25** contact current feed rails **26** and **27**, electric current or current impulses are fed to heating band **23** and the overlapped U shanks are heat sealed.

After the overlapped seam has been sealed, a further conveyor comprising conveyor belt **29** and pusher element **28** feeds the article which is now covered with the tube-like wrap into apparatus not shown which completes folding and sealing of the wrapper about the sides of article *a*.

It will, therefore, be seen that there has been provided by this invention an apparatus by which the various objects hereinbefore set forth, together with many practical advantages, are successfully achieved.

As various possible embodiments may be made of the features of this invention, all without departing from the scope thereof, it is to be understood that all matters herein set forth or shown in the acompanying drawing are to be interpreted in an illustrative and not in a limiting sense. The terminology used in this specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

What is claimed is:

1. In an apparatus for wrapping an article: means for guiding said article in a substantially straight-line path; a first endless conveyor means adjacent said guide means having one reach to engage and move said article along a first portion of said path; means associated with said first conveyor means for feeding wrapping material across the path of said article in a transverse direction thereto whereby the wrapping material covers the article in a substantially U-shaped conformation having a pair of shank portions trailing therebehind; a second endless conveyor means having one reach cooperating with said first conveyor means to engage and move said article along a second portion of said path, said second conveyor means engaging and wrapping the first of said shank portions about the trailing surface of said article as it moves the article along said straight-line path; a third endless conveyor means adjacent said guide means having one reach cooperating with said second conveyor means to engage and move said article along a third portion of said path, said third conveyor means engaging and wrapping the second of said shank portions about the trailing surface of said article as it moves the article along said straight-line path; and means to drive each of said conveyor means.

2. Apparatus according to claim 1 wherein the third conveyor means includes means to engage and wrap the second shank portion in an overlapping relation to the first shank portion of said wrapping material.

3. Apparatus according to claim 2 wherein the third

conveyor means includes means to seal the overlapped shank portions of said wrapping material.

4. Apparatus according to claim 1 including means to drive the third conveyor means at a speed varying from that of the second conveyor means.

5. Apparatus according to claim 4 wherein the drive means moves the third conveyor means at a speed greater than that of the second conveyor means as said third conveyor means engages said article.

6. Apparatus according to claim 2 including also a fourth endless conveyor means adjacent said guide means having one reach cooperating with said third conveyor means to engage and move said article along a fourth portion of said path, said fourth conveyor means including means to seal the overlapped shank portions of said wrapping material.

7. Apparatus according to claim 6 including means to drive the third conveyor means at a speed varying from that of the fourth conveyor means.

8. Apparatus according to claim 7 wherein the drive means moves the third conveyor means at a speed lesser than that of the fourth conveyor means as said fourth conveyor means engages said article.

9. In an apparatus for wrapping an article: means for guiding said article in a substantially horizontal straight-line path; a first endless conveyor means positioned generally below said guide means and having a substantially horizontal upper reach to engage and move said article along a first portion of said guide means; means associated with said first conveyor means for feeding wrapping material across the path of said article in a transverse direction thereto whereby the wrapping material covers the article in a substantially U-shaped conformation having top and bottom shank portions trailing therebehind; a second endless conveyor means positioned generally above said guide means and having a substantially horizontal lower reach cooperating with said first conveyor means to engage and move said article along a second portion of said guide means, said second conveyor means engaging and wrapping the top shank portion about the trailing surface of said article as it moves the article along said guide means; a third endless conveyor means positioned generally below said guide means and having a substantially horizontal upper reach cooperating with said second conveyor means to engage and move said article along a third portion of said guide means, said third conveyor means engaging and wrapping the bottom shank portion about the trailing surface of said article as it moves the article along said guide means; and means to drive each of said conveyor means.

10. Apparatus according to claim 9 wherein the third conveyor means includes means to engage and wrap the bottom shank portion in an overlapping relation to the top shank portion of said wrapping material.

11. Apparatus according to claim 10 wherein the third conveyor means includes means to seal the overlapped shank portions of said wrapping material.

12. Apparatus according to claim 9 including means to drive the third conveyor means at a speed varying from that of the second conveyor means.

13. Apparatus according to claim 12 wherein the drive means moves the third conveyor means at a speed greater than that of the second conveyor means as said third conveyor means engages said article.

14. Apparatus according to claim 10 including also a fourth endless conveyor means adjacent said guide means having one reach cooperating with said third conveyor means to engage and move said article along a fourth portion of said guide means, said fourth conveyor means including means to seal the overlapped shank portions of said wrapping material.

15. Apparatus according to claim 14 including means to drive the third conveyor means at a speed varying from that of the fourth conveyor means.

16. Apparatus according to claim 15 wherein the drive means moves the third conveyor means at a speed lesser than that of the fourth conveyor means as said fourth conveyor means engages said article.

No references cited.