Jan. 29, 1963 K. LIEDTKE 3,075,325

METHOD AND APPARATUS FOR FEEDING WRAPPING MATERIAL INTO A WRAPPING MACHINE

Filed Oct. 28, 1960 2 Sheets-Sheet 1

Fig. 1

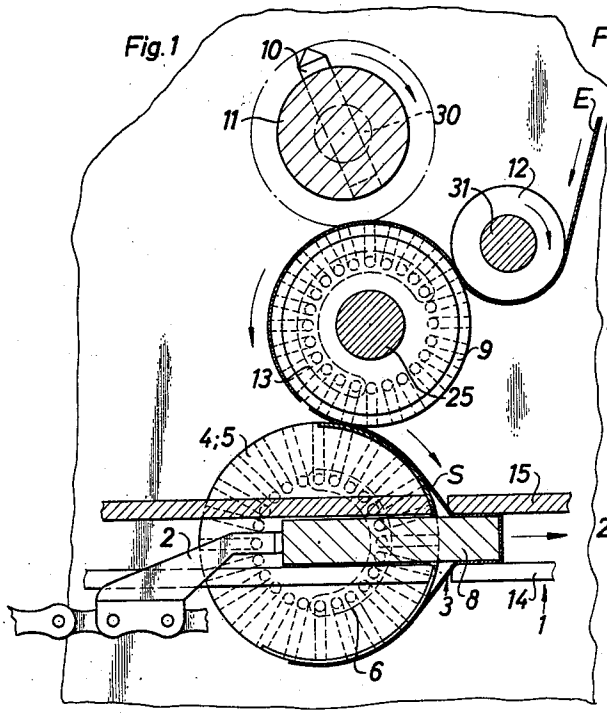


Fig. 2

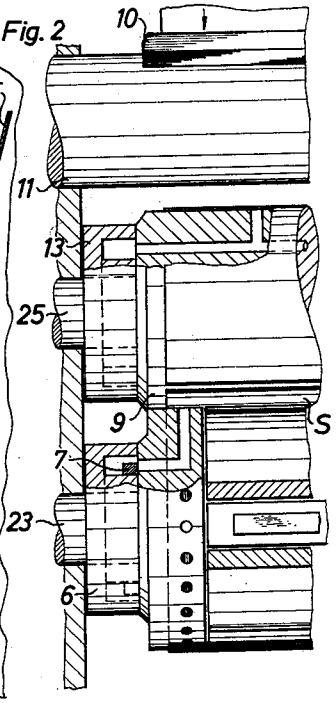
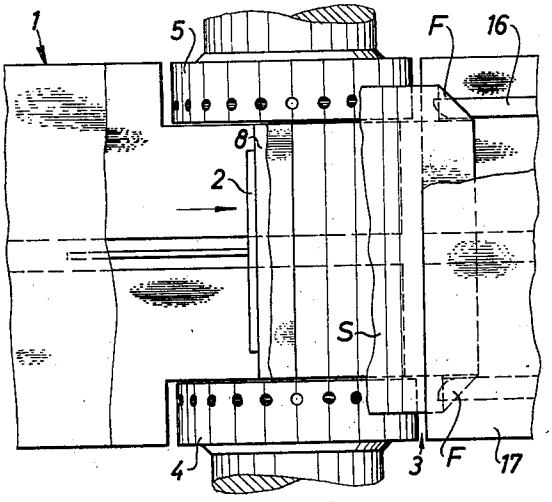


Fig. 3



Jan. 29, 1963 K. LIEDTKE 3,075,325

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Filed Oct. 28, 1960 2 Sheets-Sheet 2

Fig.4

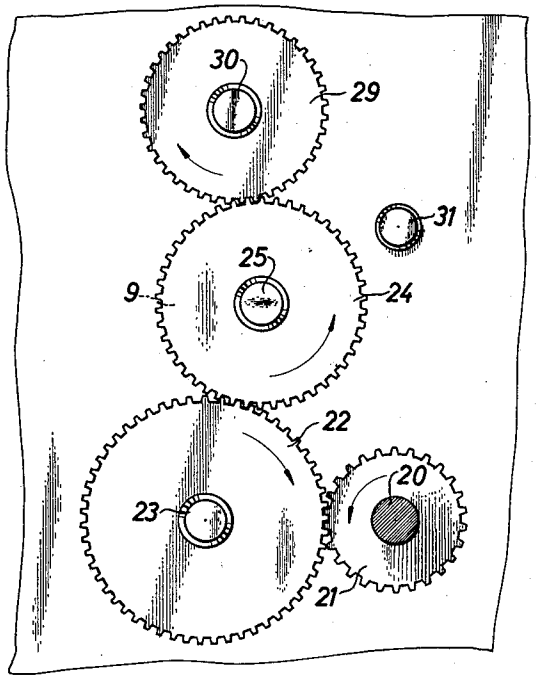
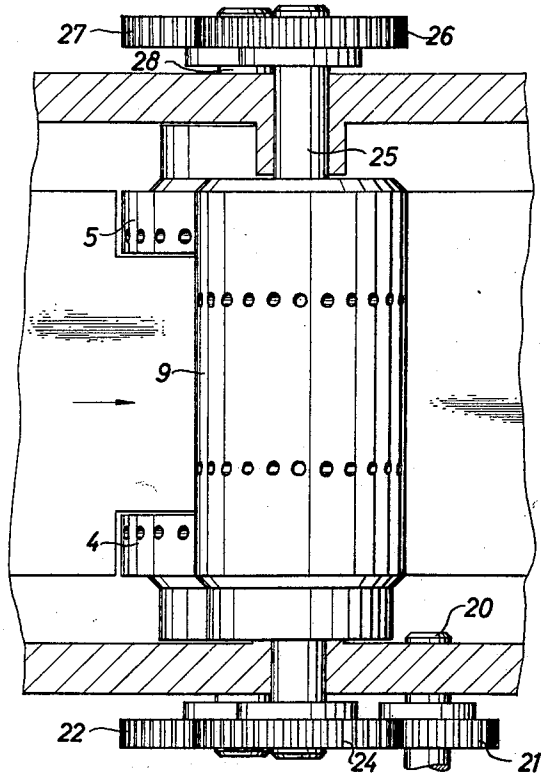


Fig. 5



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3,075,325

METHOD AND APPARATUS FOR FEEDING WRAPPING MATERIAL INTO A WRAPPING MACHINE

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13 Claims. (Cl. 53—32)

The present invention relates to a method and apparatus for feeding wrapping material into a wrapping machine and in which the wrapping material is introduced transversely into the path traversed by the article to be wrapped.

In the known methods of this kind the wrapping material, for instance a strip of sheet material, is drawn from a supply spool by means of rollers and is led through a guide provided with a slot into the path of movement of the article to be wrapped, with the leading end of the wrapping material hanging downwardly. The article to be wrapped, for example a box of cigarettes or a cigarette block, hereinafter briefly called "block," is then moved against the wrapping material by means of a feeder so that the wrapping material is folded in U-form around the block.

The feeding of the wrapping material in the manner described limits the speed of operation of the wrapping machine to a speed at which a disturbance-free downward movement of the freely suspended wrapping material is maintained. An increase of the operating speed beyond this speed creates the danger of displacement, twisting or even creasing of the wrapping material, so that the cut sheet of wrapping material is no longer folded cleanly and in correct position around the article to be wrapped.

It is an object of the present invention to increase substantially the speed of operation of a wrapping machine by firmly holding during the feeding and U-shape folding of the wrapping material the longitudinal margins of the same, which margins are subsequently folded against the end faces of the articles to be wrapped. This result is obtained by moving the wrapping material into the wrapping track by means of two laterally spaced feeding members arranged on the two sides of the wrapping track and engaging only the two longitudinal margins of the wrapper, while the driven feeding member for conveying the block is arranged between the said two wrapper feeding members, whereby the axis of movement of the driven feeding member for the block is coincident with the central conveying plane of the wrapping track.

The two laterally spaced feeding members for the material hold the latter on its two longitudinal margins and introduce the wrapping material positively into the packing track. The speed of this feeding is thus determined by the speed with which the feeding members are operated.

In a preferred constructional form of the invention the two laterally spaced feeding members consist of rotary suction rollers the axial width of which corresponds to the marginal portions of the wrapper which portions are subsequently folded against the end faces of the block. These suction rollers rotate in the feed direction and hold the wrapping material firmly against the feed movement of the driven feed member which actuates the block. The suction action in the region of the lower periphery of the suction rollers has to be in such a manner that the pulling tension exerted on the lower part of the wrapping material when being folded in U-form around the block is not greater than that exerted on the upper part of the wrapping material.

For improving the transfer of the wrapping material to the two suction rollers, a suction drum is provided in advance of the same. This suction drum may exert a suction over the entire width of the wrapping material. This suction drum in a further embodiment of the invention serves also as a cutter support or counter cutter drum for a rotary cutter drum. Such a suction counter cutter drum may be associated with a feeding drum which draws the wrapping material from a supply spool in cooperation with said suction counter cutter drum, and still other feed rollers may be located in advance of this pair of drums.

The two laterally spaced suction feed rollers for the wrapping material preferably have a peripheral speed which is somewhat smaller than the speed of feeding the article in the wrapping track so that the wrapper is folded tightly around the article, such as a cigarette box.

The suction conditions above referred to are adjusted to the most favorable value taking into account the nature of the wrapping material being handled. For this purpose a non-rotatable suction control ring may be used which is arranged in the suction chamber and controls the effective area of the suction ducts. This control ring uncovers the entire cross-sectional area of the ducts when full suction is required, or covers a part of the cross-sectional area of the ducts according to the desired reduction in the suction.

The drawings illustrate diagrammatically one constructional example of the apparatus of the invention.

FIG. 1 is a side elevation view of part of a wrapping machine with a device for feeding the wrapping material;

FIG. 2 is an end elevation view of the device with parts in section in which certain parts shown in FIG. 1 have been omitted;

FIG. 3 is a top plan view of the device shown in FIG. 1 with the suction drum and the parts arranged above it omitted;

FIG. 4 is a side elevation view of the drive mechanism of the device shown in FIG. 1, and

FIG. 5 is a top plan view of the device, similar to FIG. 3, but including the suction drum and its drive.

Referring to the drawing, a horizontally arranged wrapping track 1 is provided with a driving member 2 attached to a horizontally moving chain which moves the block 8, such as a box of cigarettes, to be wrapped against a sheet material wrapper S which is introduced transversely into the wrapping track 1 through a slot 3 therein. On the two sides of the wrapping track 1 two suction rollers 4 and 5 are arranged, as shown in FIG. 3, the end faces of the hubs of which are engaged by the adjacent end walls of stationary suction chambers 6. The suction action of the chambers 6 can be changed by adjustable control rings 7 arranged within the suction chambers 6 (see FIG. 2). The distance between the two suction rollers 4 and 5 is so great that the block 8 can pass through the same freely without lateral contact therewith, by the action of the driving member 2.

Above the two suction rollers 4 and 5 is located a rotary suction drum 9 with a suction chamber 13 therein. This suction drum 9 serves also as a cutting support for the cutter 10 on a rotary cutter drum 11 which is arranged above the suction drum 9. For guiding the wrapping material E a guide roller 12 arranged adjacent the suction drum 9 is provided.

This described portion of the wrapping machine is operated by a drive shaft 20 (FIG. 4) having mounted thereon a gear 21 meshing with a gear 22 fixed to a shaft 23 on which the suction roller 4 is fixedly mounted. The gear 22 drives a gear 24 on a shaft 25 which has

the suction drum 9 attached thereto. At the remote end of the shaft 25 is attached a gear 26 (FIG. 5) which by means of a gear 27, which corresponds to the gear 22, drives a shaft 28 to which the suction roller 5 is attached. The gear 24 drives also a gear 29 attached to a shaft 30 on which the cutter drum 11 is fixedly mounted. The guide roller 12 is mounted loosely rotatable on the shaft 31.

The method of operation of the apparatus is as follows:

The guide roller 12 conducts the wrapping material E to the suction drum 9 to the region in which the wrapping material is subjected to the influence of the suction chamber 13. A sheet S is severed from the wrapping material E by the cutter 10. This sheet S is transferred to the two suction rollers 4 and 5 and by the latter is positively fed downwardly and through the slot 3 into the horizontal wrapping track 1. When the sheet S has been fed into the correct position relatively to the block 8, the latter is moved toward the right by the feed member 2 against the center portion of the sheet S and thereby slides the same into the horizontal and vertically spaced guides 14 and 15 so that the sheet S is folded in U-shape around the block 8. Meanwhile the two ends of the sheet S are drawn from the suction rollers 4 and 5 so that a smooth and taut application of the sheet S about the block 8 is obtained.

As shown in FIG. 3, the folding of the margins F of the sheet S begins already in the position of the block 8 as shown in FIG. 1, by the lateral folding members 16, 17.

The method of operation described clearly shows that in comparison with the previously known feeding of the wrapping material E or of the wrapping sheet S into the wrapping track 1 no free or uncontrolled movement of the wrapping sheet is possible. Moreover, by changing the suction effect in the suction chamber 6 any required tension on the wrapping sheet S, depending upon the material used, can be constantly maintained.

What I claim is:

1. In an apparatus for wrapping block-shaped articles, a longitudinal track composed of two parallel and spaced guide members between which the article to be wrapped is moved, means for feeding sheet-like wrapping material transversely into said track, means for moving the article to be wrapped along said track and against the wrapping material which during the movement of said article is wrapped U-shaped around the same, and rotary suction rollers whose axes of rotation are positioned in the center plane of said track for subjecting the lengthwise extending marginal portions of said wrapping material to frictional forces while it is fed transversely into said track and during the time it is folded in U-shape around the article so as to assure a smooth and straight placement of the wrapping material against said article.

2. In an apparatus for wrapping block-shaped articles, a longitudinal track composed of two parallel and spaced guide members between which the article to be wrapped is moved, means for feeding sheet-like wrapping material transversely into said track, means for moving the article to be wrapped along said track and against the wrapping material which during the movement of said article is wrapped U-shaped around the same, rotary suction rollers whose axes of rotation are positioned in the center plane of said track for subjecting the lengthwise extending marginal portions of said wrapping material to frictional forces while it is fed transversely into said track and during the time it is folded in U-shape around the article so as to assure a smooth and straight placement of the wrapping material against said article, and means for folding said marginal portions of said wrapping material against the lengthwise extending end faces of said article.

3. In an apparatus for wrapping block-shaped articles, a longitudinal track composed of two parallel and spaced guide members between which the article to be wrapped is moved, means for feeding sheet-like wrapping material transversely into said track, means for moving the article to be wrapped along said track and against the wrapping material which during the movement of said article is wrapped U-shaped around the same, and rollers whose axes of rotation are positioned in the center plane of said track for subjecting the lengthwise extending marginal portions of said wrapping material to frictional forces while it is fed transversely into said track and during the time it is folded in U-shape around the article so as to assure a smooth and straight placement of the wrapping material against said article.

4. In an apparatus for wrapping block-shaped articles, a longitudinal track composed of two parallel and spaced guide members between which the article to be wrapped is moved, means for feeding sheet-like wrapping material transversely into said track, means for moving the article to be wrapped along said track and against the wrapping material which during the movement of said article is wrapped U-shaped around the same, rollers whose axes of rotation are positioned in the center plane of said track for subjecting the lengthwise extending marginal portions of said wrapping material to frictional forces while it is fed transversely into said track and during the time it is folded in U-shape around the article so as to assure a smooth and straight placement of the wrapping material against said article, and means for folding said marginal portions of said wrapping material against the lengthwise extending end faces of said article.

5. Apparatus according to claim 1, including a suction drum arranged adjacent said two rotary suction rollers for transferring the wrapping material to said suction rollers.

6. Apparatus according to claim 1, including a suction drum arranged adjacent said two rotary suction rollers for transferring the wrapping material to said suction rollers, a cutter drum, said suction drum also serving as a counter roller for said cutter drum which severs the wrapping material into individual sheets before the latter are introduced into said track.

7. Apparatus according to claim 1, including a suction drum arranged adjacent said two rotary suction rollers for transferring the wrapping material to said suction rollers, and a guide roller adjacent said suction drum for feeding a continuous sheet of wrapping material to said suction drum.

8. Apparatus according to claim 1, including a suction drum arranged adjacent said two rotary suction rollers for transferring the wrapping material to said suction rollers for transferring the wrapping material to said suction rollers, a guide roller adjacent said suction drum for feeding a continuous sheet of wrapping material to said suction drum, and means for cutting said continuous sheet of wrapping material while on said suction drum into individual sheets before they are transferred to said two suction rollers.

9. A method of wrapping articles into wrapping material including the steps of:

(*a*) feeding a continuous strip of wrapping material toward a wrapping station,

(*b*) holding said strip of wrapping material by suction air in its feeding path,

(*c*) transversely cutting said continuous strip of wrapping material while being held by suction air to form a piece of wrapping material having a predetermined length,

(*d*) continuing the feeding of the severed piece of wrapping material while being subjected to suction air,

(*e*) introducing said piece of wrapping material into the wrapping station transversely to the lengthwise direction of the article to be wrapped while holding the entire longitudinal margins of said wrapping material by suction air, and

(*f*) moving said article against said wrapping material while the latter is subjected along its longitudinal margins to the action of suction air so that the wrap-

ping material is moved outwardly of its path of movement and moves with said article, thereby causing the wrapping material to slip and its longitudinal edges to be relieved from the action of suction air.

10. A method of wrapping block-shaped articles into wrapping material including the steps of:

(*a*) feeding a continuous strip of wrapping material toward a wrapping station,

(*b*) cutting from said continuous strip of wrapping material individual pieces having a predetermined length,

(*c*) continuing the feeding of said pieces of wrapping material by holding the same against relative movement with respect to each other,

(*d*) introducing said piece of wrapping material into the wrapping station transversely to the lengthwise direction of the article to be wrapped while holding the entire longitudinal margins of said wrapping material by suction air, and

(*e*) moving said article against said wrapping material so that the latter is moved outwardly of its path of movement and moves with said article, thereby causing the wrapping material to slip and its longitudinal edges to be relieved from the action of suction air.

11. A method of wrapping block-shaped articles into wrapping material including the steps of:

(*a*) feeding a continuous strip of wrapping material toward a wrapping station,

(*b*) cutting from said continuous strip of wrapping material individual pieces having a predetermined length,

(*c*) continuing the feeding of said pieces of wrapping material by holding the same against relative movement with respect to each other,

(*d*) introducing said piece of wrapping material into the wrapping station transversely to the lengthwise direction of the article to be wrapped while holding the entire longitudinal margins of said wrapping material by suction air, and

(*e*) moving said article against said wrapping material while the latter is subjected along its longitudinal margins to the action of suction air so that the wrapping material is moved outwardly of its path of movement and moves with said article, thereby causing the wrapping material to slip and its longitudinal edges to be relieved from the action of suction air and to fold against the upper and lower faces of said article and simultaneously folding said longitudinal

margins of said wrapping material against the end faces of said article.

12. An apparatus for wrapping block-shaped articles, including a longitudinal track, means for guiding the article to be wrapped in a straight line along said track, means for feeding sheet-like wrapping material transversely into said track, means for moving the article to be wrapped along said track against the wrapping material which during the movement of said article is wrapped U-shaped around the same, rotary suction rollers whose axes of rotation are arranged in axial alignment, and to both sides of said track for subjecting the lengthwise extending marginal portions of said wrapping material to frictional forces while it is fed transversely into said track and during the time it is folded in U-shape around the article so as to assure a smooth and straight placement of the wrapping material against said article, and means for folding said marginal portions of said wrapping material against the lengthwise extending end faces of said article.

13. An apparatus for wrapping block-shaped articles, comprising a track for supporting the articles to be wrapped, means for guiding the articles to be wrapped along said track, means for feeding sheet-like wrapping material transversely into said track, means for moving the article to be wrapped along said track against the wrapping material which during the movement of said article is wrapped U-shaped around the same, rotary suction rollers whose axes of rotation are arranged in axial alignment, and to both sides of said track for subjecting the lengthwise extending marginal portions of said wrapping material to frictional forces while it is fed transversely into said track and during the time it is folded in U-shape around the article so as to assure a smooth and straight placement of the wrapping material against said article, and means for folding said marginal portions of said wrapping material against the lengthwise extending end faces of said article.

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