

Oct. 12, 1948.

W. HOPPE

2,451,287

WRAPPER FEED FOR WRAPPING MACHINES

Filed April 8, 1944

4 Sheets-Sheet 1

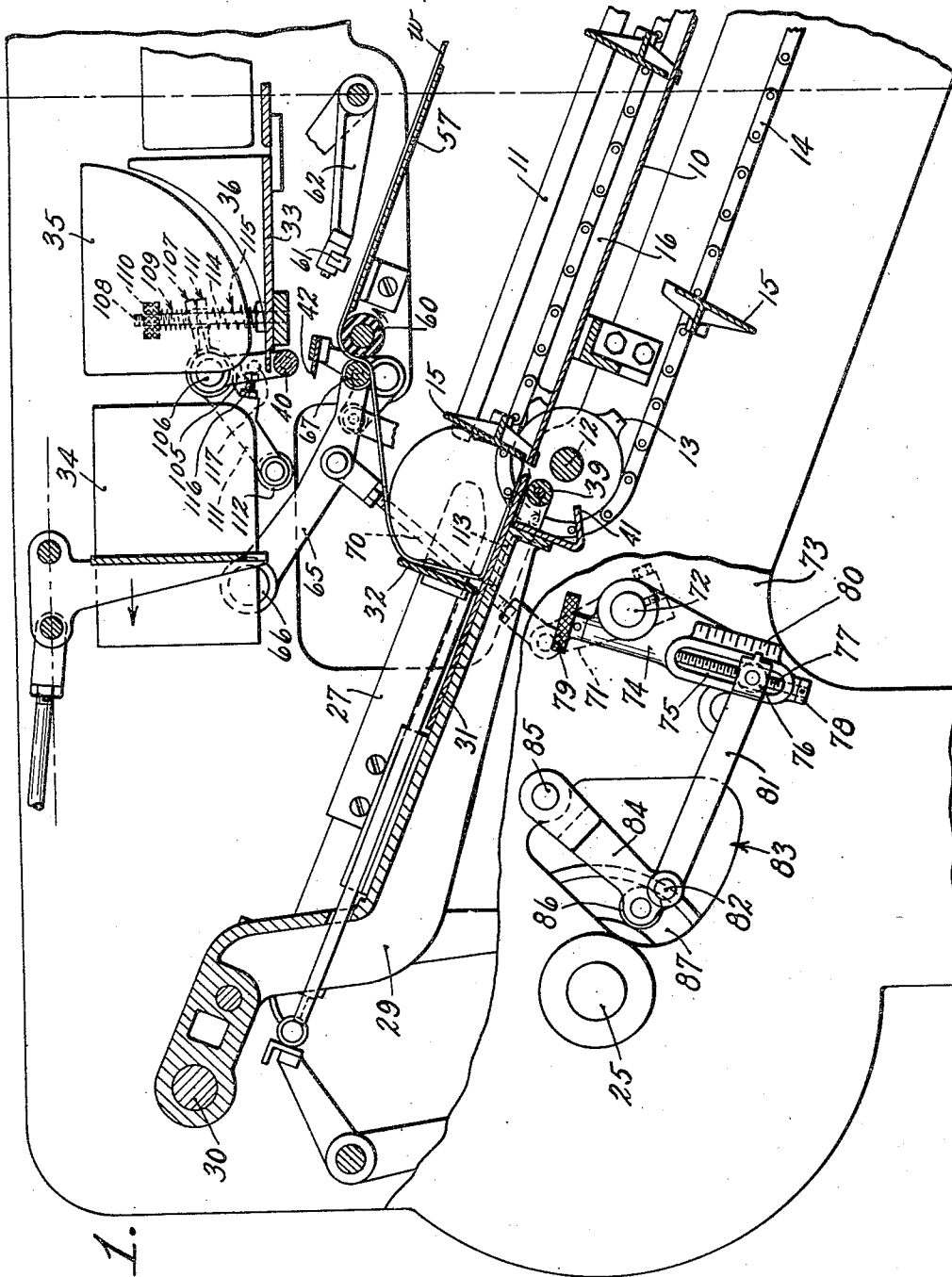


Fig. 1.

INVENTOR
WILLIAM HOPPE
BY
Chapin & Neal
ATTORNEYS

Oct. 12, 1948.

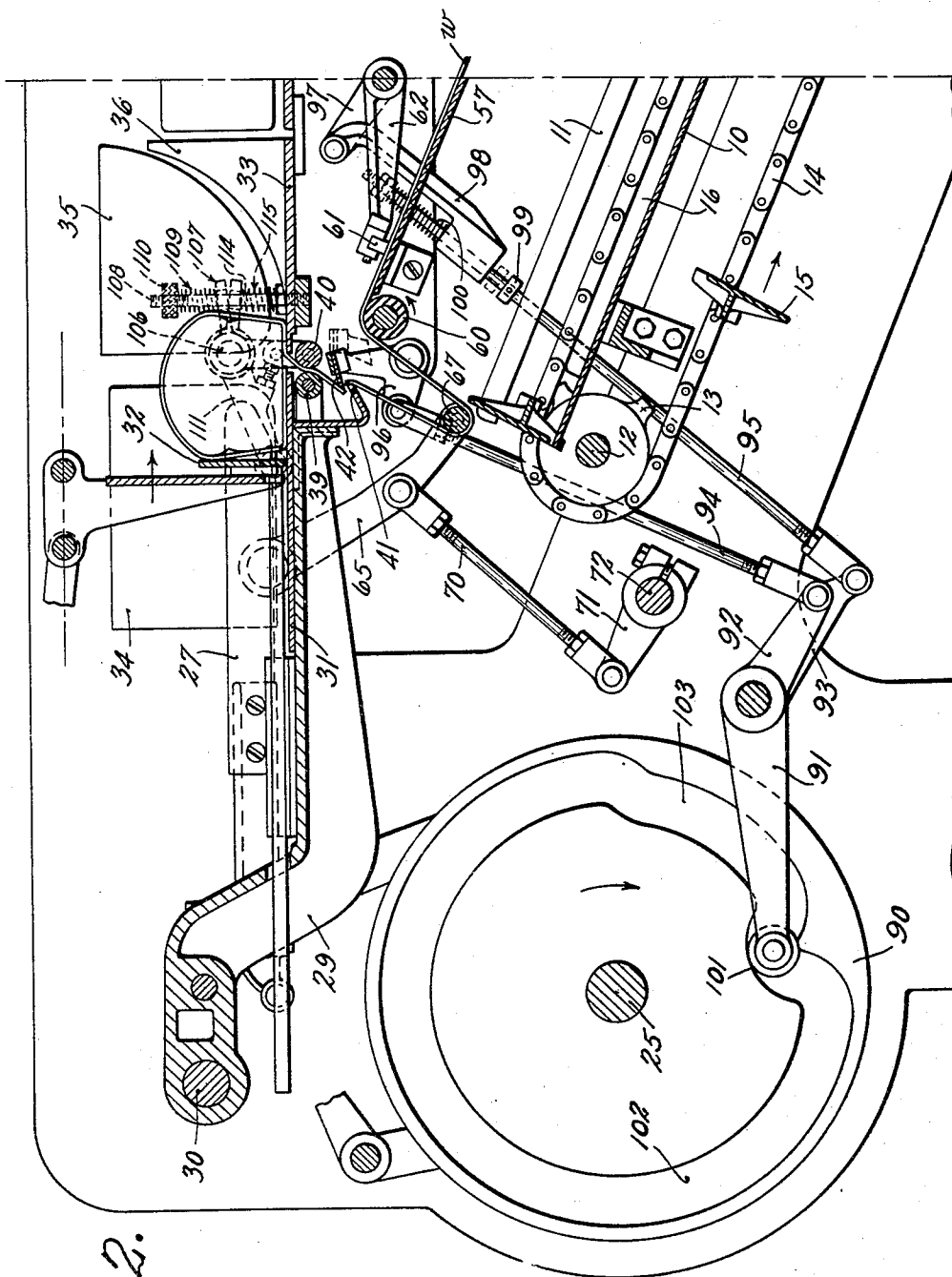
W. HOPPE

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INVENTOR
WILLIAM HOPPE
BY *Chapin & Neal*
ATTORNEYS

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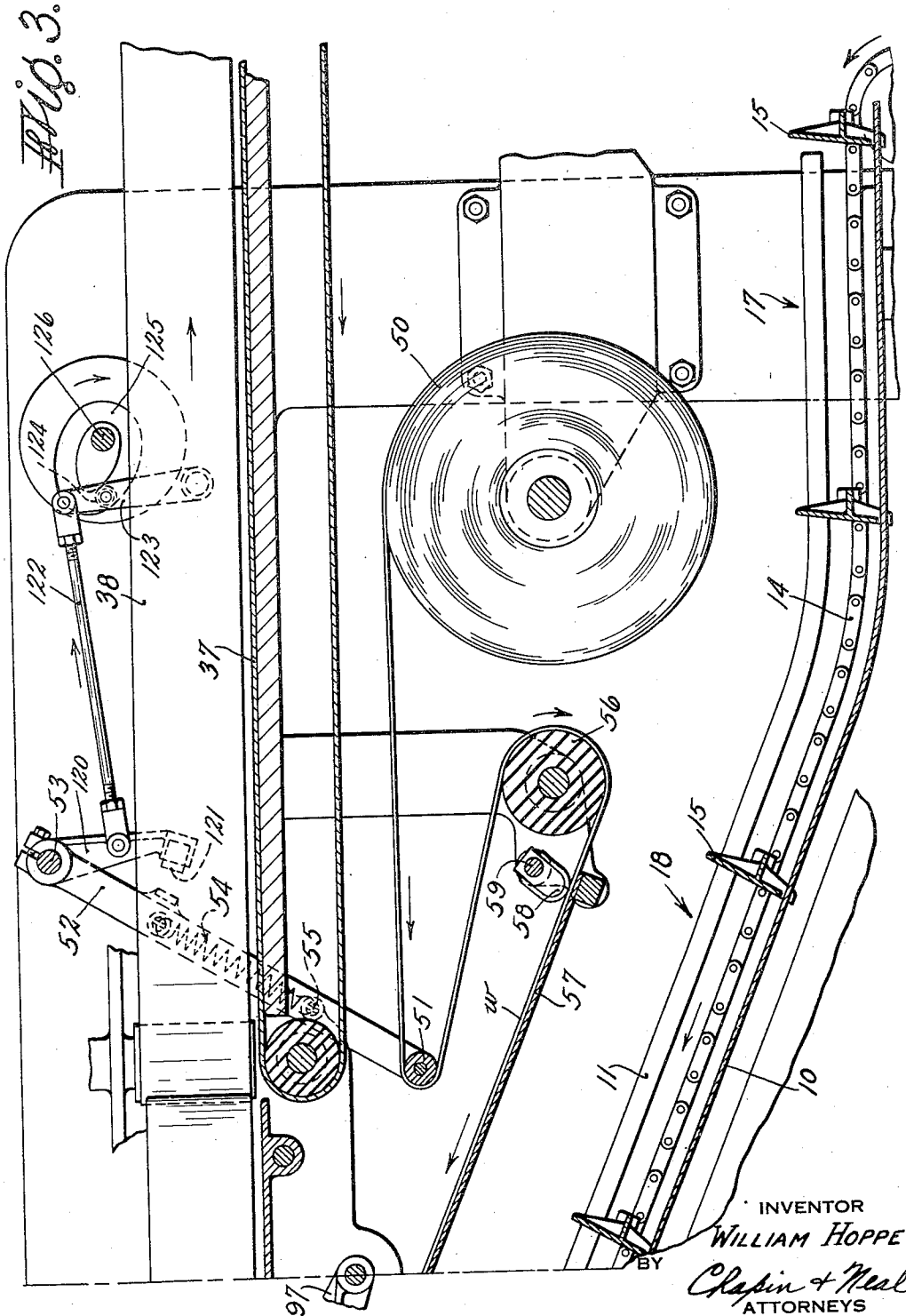
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

Fig. 4.

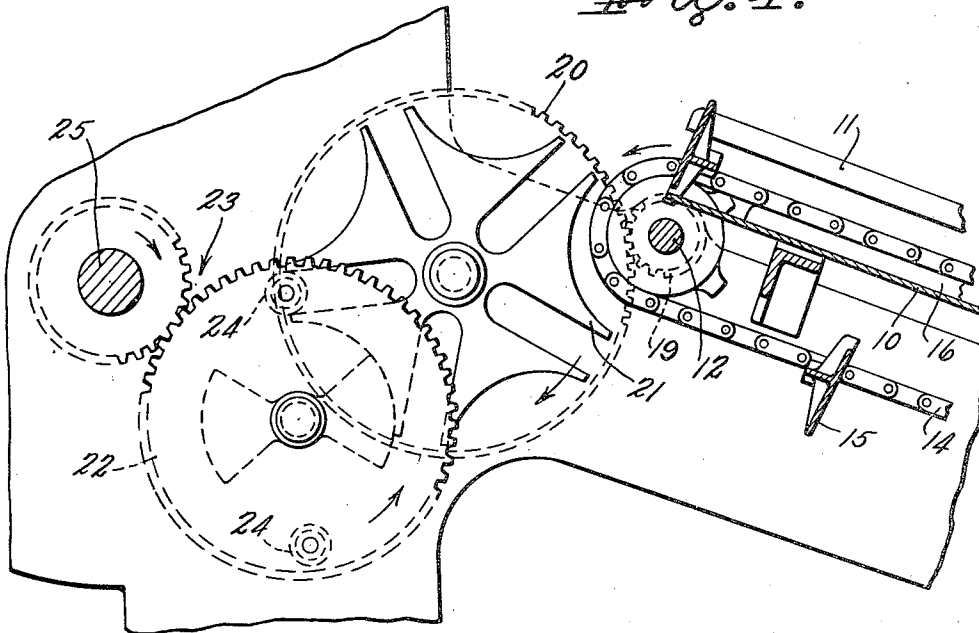
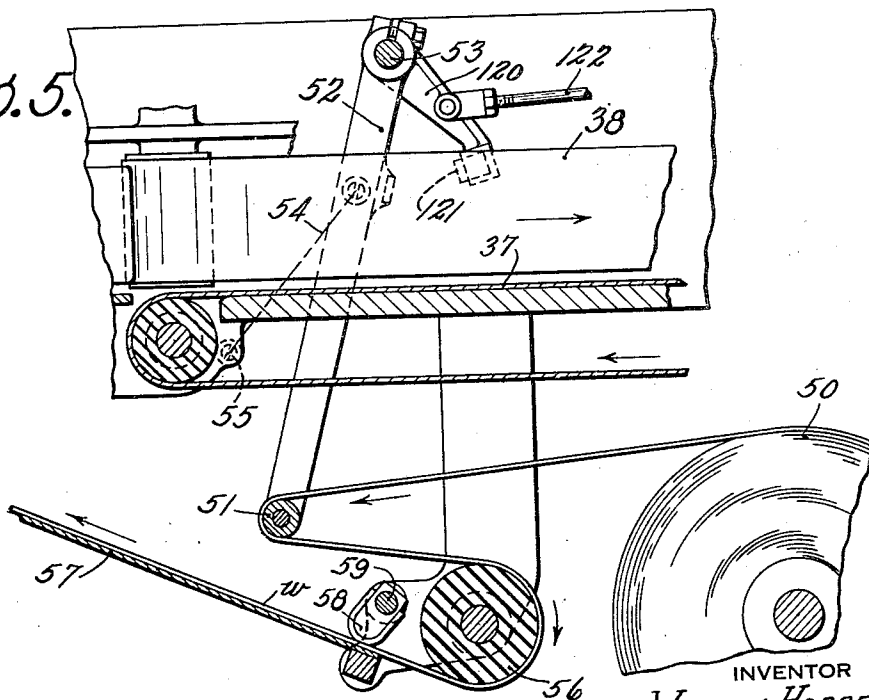


Fig. 5.



INVENTOR
WILLIAM HOPPE
BY
Chapin & Neal
ATTORNEYS

UNITED STATES PATENT OFFICE

2,451,287

WRAPPER FEED FOR WRAPPING MACHINES

William Hoppe, Longmeadow, Mass., assignor to
National Bread Wrapping Machine Co., Spring-
field, Mass., a corporation of Massachusetts

Application April 8, 1944, Serial No. 530,152

8 Claims. (Cl. 93—2)

1

This invention relates to improvements in wrapper feeding mechanism for wrapping machines of the type in which the leading end of the wrapper web is circumferentially wrapped about the article before being severed from the body of the web. In some aspects it is an improvement upon the structures shown in, and in other aspects the present application is a continuation in part of my prior applications Serial No. 454,275 filed Aug. 10, 1942, now Patent 2,347,560 granted May 25, 1944, and Serial No. 434,486 filed March 13, 1942 now Patent 2,330,715 granted Sept. 28, 1943.

One object of the invention is to decrease, and to make more uniform during the wrapping operation, the tension of the wrapper as it is drawn circumferentially about the article. Particularly in the wrapping of readily deformable articles such as sliced loaves of bread, prior wrapping machines have had a tendency to crush the corners of the loaves. Loaves, even in the same run, vary considerably in size, and a much closer conformity of the cut wrapper to the dimensions of the individual loaf is obtained by wrapping the loaf in the leading end of the web before severing the latter. This necessitates that the article itself draw out the wrapper as required, placing some inevitable strain upon the article. In my prior Patent 2,273,961, Feb. 24, 1942, and in the application and patent referred to above, I have disclosed the use of one or more web feeding rolls which engage the web by impositive frictional contact during at least the period when the web is being drawn out by the article, thus greatly reducing the pull which it is necessary for the article to exert. In accordance with the present improvement, the web is supplied to these frictional rolls from a second frictional roll, a slack take-up device being positioned between the two rolls in such a manner that the tension on the web is further reduced as will be described below. In fact this tension is almost imperceptible when the end of the web is drawn out by hand, while there is no tendency for the web to overrun when the pull on it is relaxed.

A further object is to provide a machine, capable of wrapping an article in the unsevered leading end of a web, which is capable of operation by one man who can both supply unwrapped articles to and remove wrapped articles from the machine. This result is greatly enhanced by the decrease of the tension on the web, since the occurrence of crushed loaves or ruptured webs which would require the presence of an operator

2

elsewhere than at the loading and unloading station has been practically eliminated.

A further object is to provide a web feeding mechanism which, by reason of its compact size and since it produces practically no free slack, can be placed between the superposed infeed and outfeed conveyors required for a simple machine intended for one man operation.

A further object is, to improve upon existing mechanisms by providing for positive holding of the web at all times when the leading end of the latter is not held by engagement with the article.

Additional objects will appear from the following description and claims.

Referring to the drawings,

Fig. 1 is a median section through a wrapping machine including the invention;

Fig. 2 is a similar view with the parts in different positions; and

Fig. 3 is a continuation of Fig. 1 showing the wrapper supply roll and associated mechanism;

Fig. 4 is a detail of the infeed conveyor drive; and

Fig. 5 is a view similar to a part of Fig. 3 but with the parts in different positions.

The general mechanism of the wrapping machine forming no part of the present invention it will not be described in detail. As far as relates to the invention, the wrapping machine comprises an infeed conveyor having ways 10 along which articles, such as sliced loaves of bread, can be forwarded, and side guides 11. A shaft 12 supports the driving sprockets 13 of chain conveyors 14 having pushers 15 connected across them and being suitably guided in channels 16 preferably shaped so that the conveyor has a substantially horizontal portion 17 (Fig. 3) and a succeeding upwardly inclined portion 18 the purpose of which will appear more fully below. Shaft 12 has a gear 19 (Fig. 4) meshing with a gear 20 on the shaft of the slotted member 21 of a Geneva drive. The roll carrying member 22 of the Geneva, geared at 23 to a drive shaft 25, is preferably provided with two rolls 24 engaging with five radial slots in the member 21.

On a pivot 30 (Figs. 1 and 2) swings a carrier 29 having an article receiving plate 31, side tuckers 27, and a frictionally held backing plunger 32. These parts may be constructed as in my prior application Serial No. 454,275, in which the carrier is shown as being oscillated by a cam on shaft 25 from a position aligned with the terminus of the slanting part of the infeed conveyor to an upper horizontal position in line with the floor 33 of a wrapping and discharge

channel. Along this channel, at opposite ends of the article, are located in order a top folder 34, an end folder 35 (the opposite end fold having been made by the tuckers 27) and a bottom folder 36. The channel may also contain the usual bottom and end heat sealers (not shown) and bottom and side conveyor belts 37 and 38 (Fig. 3) which serve both to hold the end flaps during cooling and to convey the articles from the machine. The carrier has a roll 39 coacting with a spring pressed roll 40 (described in more detail below) at the entrance to the channel in order to give the final bottom flap the proper amount of tension. A knife 41 fixed on the carrier coacts with a movable knife 42 which severs the web as in my prior application.

As previously stated, one novel feature of the invention resides in the mechanism by which the wrapper web is fed towards the carrier in the exact amount required by the progressive envelopment of the article, the term "envelopment" being used for convenience to denote the passage of the wrapper circumferentially around the article as distinguished from the making of end folds. This mechanism will now be described. A reel 50 of wrapping material is mounted between the discharge conveyor 37 and the horizontal part 17 of the infeed conveyor, preferably on a self-centering mounting such as is shown in the Hoppe and Roberts Patent 2,134,043, Oct. 25, 1935. The web *w* is led from the reel over a floating slack take-up roll 51 carried by the lower ends of arms 52 mounted on a shaft 53 pivoted to the machine frame. This roll has a substantial travel toward and away from the reel to take up and yield slack in a bight formed in the web, and is tensioned away from the reel by one or more springs 54 connecting an intermediate point of one or both arms 52 with a fixed point 55 on the machine. The point 55 is so chosen that when the floating roll is in its forward position (away from the reel 50) the spring is substantially in the line of the arms. When the roll swings towards the reel the spring tension will thus progressively increase. The importance of this will appear more fully below.

From the floating roll 51 the web *w* passes around a roll 56 preferably having a frictional surface such as a rubber and rotating constantly in the direction indicated at a surface speed at least as high as the maximum linear speed which will be required of the web during the wrapping operation. Since the specific driving mechanism for the roll is not of importance it has not been illustrated. The web passes about half-way around the roll 56 and then travels along a supporting plate 57 which terminates above the infeed conveyor near the carrier. A drag 58 of usual form rests lightly on the web, being pivoted at 59 and being tilted somewhat in the direction of travel of the web so as to prevent retrograde motion of the latter while offering negligible resistance to its forward travel.

Near the end of the supporting plate a roll 60 is located, being constantly driven in the direction indicated by any suitable driving means at a surface speed at least equal to the maximum linear speed of the web. This roll also preferably has a frictional surface. A web clamp 61 is mounted on arms 62 and is driven from the knife mechanism in a manner to be described. It serves to clamp the web during cutting, to hold the web against any possibility of shifting during such times as the end of the web may not be engaged by the article, and to cooperate with the slack

take-up roll as will be described. Mounted in arms 65 pivoted at 66 to the frame is a freely rotatable roll 67 adapted to travel, approximately between the roll 60 and the carrier, from a position alongside the roll 60 to a lowered position near the end of the infeed conveyor. This roll serves, as will appear below, to cause a length of web to be fed out in addition to that drawn out by the article, so that the leading end of the web will hang down in front of the next advancing article.

Since the web is always severed by knife 42 at a definite distance away from one bottom edge of the article, and the amount fed out by roll 67 varies the length of wrapper extending beyond the opposite bottom edge, adjustment of the stroke of roll 67 will directly vary the overlap of the cut wrapper edges on the bottom of the article. The present mechanism permits this adjustment to be made to scale while the machine is running. For this purpose one or both of the arms 65 carrying roll 67 are coupled by a link 70 with a crank arm 71 extending from a shaft 72 which at one end passes through the side frame 73 of the machine into an accessible position. Outside of the frame is a crank member 74 having a slot 75 in which slides a crank block 76. A screw 77 is journaled in the member 76 and held against endwise movement by a collar 78 and a handwheel 79 by which it can be rotated to shift the block into a predetermined position as indicated upon a scale 80. The crank pin is pivoted to a link 81 coupled to an arm 84 by a pivot pin 82 passing through an opening 83 in the frame. The arm 84 is pivoted to the frame at 85 and carries a roll 86 running in a cam 87 on shaft 25. Since the handwheel is exposed on the outside of the frame 73 and since it is located sufficiently close to its axis of oscillation 72 so that it does not have very much motion, it is readily adjusted during the operation of the machine to control the amount of overlap.

The knife 42 and the clamp 61 are both operated from a single cam 90 which may be angularly adjustable on shaft 25 in order to vary the timing of the cut and hence the length of the second under-flap of the wrapper. This cam actuates a rocker 91 having separate arms 92, 93 coupled by links 94, 95 to the knife bell crank 96 and to the clamp operating arm 97 respectively. The latter coupling is obtained through a member 98 mounted on link 95 between a fixed collar 99 and a spring 100, the collar and spring being so set that considerable spring compression is possible after the clamp has seated against the web. Cam 90 has a deep depression 101 causing the knife to cut as in Fig. 2, a circular portion 102 by which the knife and clamp are both withdrawn to inactive positions, and a segmental portion 103 by which the knife will be drawn back far enough to clear the carrier while the collar 99 will not quite have reached member 98 and spring 100 consequently still holds the clamp against the web. This position of the knife and collar are shown in dotted lines in Fig. 2. The latter position is assumed as soon as the cut is over, and is maintained until the next article to be wrapped is about to strike the web, so that there is no opportunity for the web to become shifted.

It has been mentioned that the roller 40 which presses the web against the roll 39 on the carrier was spring pressed to subject the final flap to proper tension. So that the roll 40 may not

5

interfere with the loaf as the carrier rises it is preferably kept in an inactive position except when the carrier is in substantial alignment with the wrapping channel. For this purpose the roll 40 is mounted on arms 105 extending from a shaft 106. This shaft also carries an arm 107 which loosely fits over a pin 108 having a spring 109 between the arm and an adjusting nut 110. Unless prevented by some other means the spring 109 causes the roll 40 to press against the roll 39 with a pressure regulable by turning nut 110. Shaft 106 is also provided with a rocker 111 carrying at one end a roll 112 adapted to be elevated by contact with a plate 113 on the side of the carrier, and at its other end loosely fits over a pin 114 having a compression spring 115 below it. The rocker also carries an adjustable stop 116 adapted to contact a pin 117 on one of the arms 105. Spring 115 is stronger than spring 109 so that normally it swings the rocker 111 counterclockwise. Contact of stop 116 with a pin 117 also swings the arms 105 and the arm 107 in the same direction, compressing the weaker spring 109. When the carrier rises the rocker is turned clockwise, compressing the stronger spring 115 and leaving spring 109 free to actuate the roller 40.

A further desirable refinement consists in means for positively supplementing the action of the spring 54 on the roll 51, so that since the entire burden of unwinding the web from roll 50 is not borne by the spring 54 the latter can be made lighter. This further reduces the pull on the article necessary to feed out the web. Adjacent one or both of the roll supporting arms 52 is an arm 120 carrying an abutment 121 positioned to contact the arm 52 and move it positively away from roll 50. As shown, the arm 120 is connected by a link 122 with a lever 123 pivoted to the frame and having a cam roll 124 running in a face cam 125 on a shaft 126. The parts are so timed that during the period in which the web is not being drawn out by the article—in other words, when the clamp 61 is holding the web firmly—the roll 51 will be moved away from roll 50 so that a full amount of slack is available for the article to draw from. The arm 120 then withdraws from contact with the arm 52 during the period when the web is being drawn out by the article.

Assuming the roll 51 to have been moved into the position of Fig. 3 either by the arm 120 or by spring 54, and that a loaf is moved by a flight 15 so as to grasp the leading end of the web between it and the backing plate 32, the action is as follows: As the loaf advances onto the carrier it will tighten the web around roll 60 as is in Fig. 1. The frictional contact of this constantly rotating roll will cause the web to be pulled against the also constantly rotating roll 56. Roll 60 acts to feed forward the web delivered by roll 56 and also to cause the feeding action of the latter by tightening the web around it. Roll 56 assumes the heavier burden of unwinding the web from reel 50, and for this reason preferably has longer surface contact with the web than does roll 60. Either roll will of course cease forwarding the web as soon as the forward pull on the web beyond the roll is released. When the article first starts to pull on the web the slack take-up roll 51 is in its position of minimum tension and the reel 50 is presumably at rest. The initial forwarding of the web thus occurs without shock and under only slight tension. As the take-up roll is drawn to the right in Fig. 3 the

6

tension of the web around roll 56 is increased in proportion to the movement of roll 51, insuring ample power to start reel 50 in rotation. As the demand for wrapping material lessens the roll 51 will tend to regain its normal position of Fig. 3, decreasing the pull on reel 50 and allowing the latter to come slowly to rest. There is much less tendency for reel 50 to overrun in the arrangement shown than were the take-up roll to be placed beyond roll 56 rather than between it and reel 50, and the pull necessary for the article to exert upon the web to cause it to be fed out is very greatly reduced.

I claim:

1. A wrapping machine having a substantially horizontal wrapping and discharge channel, an infeed conveyor located in substantially the same plane vertically below said channel and having an upwardly inclined terminal portion, a carrier pivotally mounted and driven to oscillate between the terminus of the conveyor and the terminus of the channel, a supply for a web of wrapping material located between the conveyor and the channel, a rotating web feeding roll mounted between the conveyor and the channel adjacent the carrier and operating to feed the web when the latter is drawn tightly around it, a second rotatable roll positioned between the feeding roll and the carrier to maintain the web in an arc surrounding the feeding roll during the movement of the carrier from the conveyor to the channel, flights on the conveyor positioned to convey an article therealong, means for driving the conveyor intermittently in such timed relation as to carry articles successively onto the carrier when the latter is adjacent the terminus of the conveyor and to hold the flight conveying each said article in position to act as an article guide as the carrier moves away from the conveyor.

2. A wrapping machine having a substantially horizontal wrapping and discharge channel, an infeed conveyor located in substantially the same plane vertically below said channel and having an upwardly inclined terminal portion, a carrier pivotally mounted and driven to oscillate between the terminus of the conveyor and the terminus of the channel, a supply for a web of wrapping material located between the conveyor and the channel, a rotating web feeding roll mounted between the conveyor and the channel adjacent the carrier and operating to feed the web when the latter is drawn tightly around it, a second rotatable roll positioned between the feeding roll and the carrier to maintain the web in an arc surrounding the feeding roll during the movement of the carrier from the conveyor to the channel, flights on the conveyor positioned to convey an article therealong, means for driving the conveyor intermittently in such timed relation as to carry articles successively onto the carrier when the latter is adjacent the terminus of the conveyor and to hold the flight conveying each said article in position to act as an article guide as the carrier moves away from the conveyor, means for moving the second roll towards the conveyor when the carrier is adjacent the channel to cause an additional length of web to be fed, and means for severing the web between the carrier and said roll.

3. A wrapping machine having means for enveloping an article in the leading end of a web, and means for feeding a web to the enveloping means comprising a wrapper supply roll, a first constantly rotating web forwarding roll, a slack

7

take-up roll around which the web passes between the supply roll and the first forwarding roll, and a second constantly rotating web forwarding roll delivering the web to the enveloping means, whereby the wrapper web will be forwarded as required by the enveloping means but without excess.

4. A wrapping machine having means for enveloping an article in the leading end of a web, and means for feeding a web to the enveloping means comprising a wrapper supply roll, a first web forwarding roll constantly rotating at a surface speed at least equal to the maximum required of the web, a slack take-up roll around which the web passes between the supply roll and the first forwarding roll, a spring acting on the take-up roll to increase the tension on the roll as the latter is drawn toward the supply roll, said slack take-up roll being so located that in all its positions it guides the web to freely encircle a portion of the circumference of the first web forwarding roll, and a second web forwarding roll constantly rotating at a surface speed at least equal to the maximum required of the web and delivering the web to the enveloping means, whereby the wrapper web will be forwarded as required by the enveloping means but without excess.

5. A wrapping machine having means for enveloping an article in the leading end of a web, and means for feeding a web to the enveloping means comprising a wrapper supply roll, a first web forwarding roll constantly rotating at a surface speed at least equal to the maximum speed required of the web and located to forward the web by impositive frictional contact, a slack take-up roll around which the web passes between the supply roll and the first forwarding roll, a spring acting on the take-up roll to increase the tension as the latter is drawn toward the supply roll, a second web forwarding roll located to deliver the web by impositive frictional contact to the enveloping means, means for preventing retrograde movement of the web at least when the web is not being fed to the enveloping means, and mechanism positively moving the slack take-up roll to provide maximum slack during such periods when the web is not being fed.

6. A wrapping machine having means for enveloping an article in the leading end of a web, and means for feeding a web to the enveloping means comprising a wrapper supply roll, a first web forwarding roll constantly rotating at a surface speed at least equal to the maximum speed required of the web and located to forward the web by impositive frictional contact, a slack take-up roll around which the web passes between the supply roll and the first forwarding roll, a spring acting on the take-up roll to increase the tension as the latter is drawn toward the supply roll, said spring being substantially at right angles to the line of movement of the slack take-up roll when the latter is in position to provide maximum slack, and a second web forwarding roll lo-

8

cated to deliver the web by impositive frictional contact to the enveloping means.

7. A wrapping machine comprising means for enveloping an article in the leading end of a wrapper web, a supply roll for the wrapper web, a roll constantly driven at a surface speed at least equal to the maximum speed required of the web during the wrapping operation and located to engage the web between the supply roll and the enveloping means, a freely rotatable guide roll located to engage the web between the constantly driven roll and the enwrapping means, means for severing the web from the wrapped article, and means for shifting the guide roll bodily prior to the severance of the web to cause an additional length of web to be fed out, said last means including an oscillatable shaft, a crank thereon, means connecting said crank to the guide roll for shifting the guide roll bodily, a second crank on the oscillatable shaft, and means for actuating the second crank, one of said cranks being adjustable in length and positioned where it can be reached and adjusted during the operation of the machine.

8. A wrapping machine comprising a wrapping channel, an infeed station below the channel, a carrier movable between the channel and the station, means for feeding wrapping material between the station and the carrier in position to be picked up by an article being moved onto the carrier, a roll underneath and at the forward edge of the carrier, a spring-pressed roll mounted underneath the channel to hold the trailing edge of the wrapper against the first-mentioned roll, a spring means operating on the second-named roll in a direction tending to shift the roll into a position in which it can contact the first-mentioned roll, additional spring means operating on the second-named roll with greater force than the first-named spring means and in the opposite direction, whereby the second-named roll will be held normally out of such contacting position, and means actuated by the carrier when coming into alignment with the channel to inactivate said additional spring means and thereby allow the first-named spring means to shift the second-named roll into such contacting position.

WILLIAM HOPPE.

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