

Dec. 29, 1959

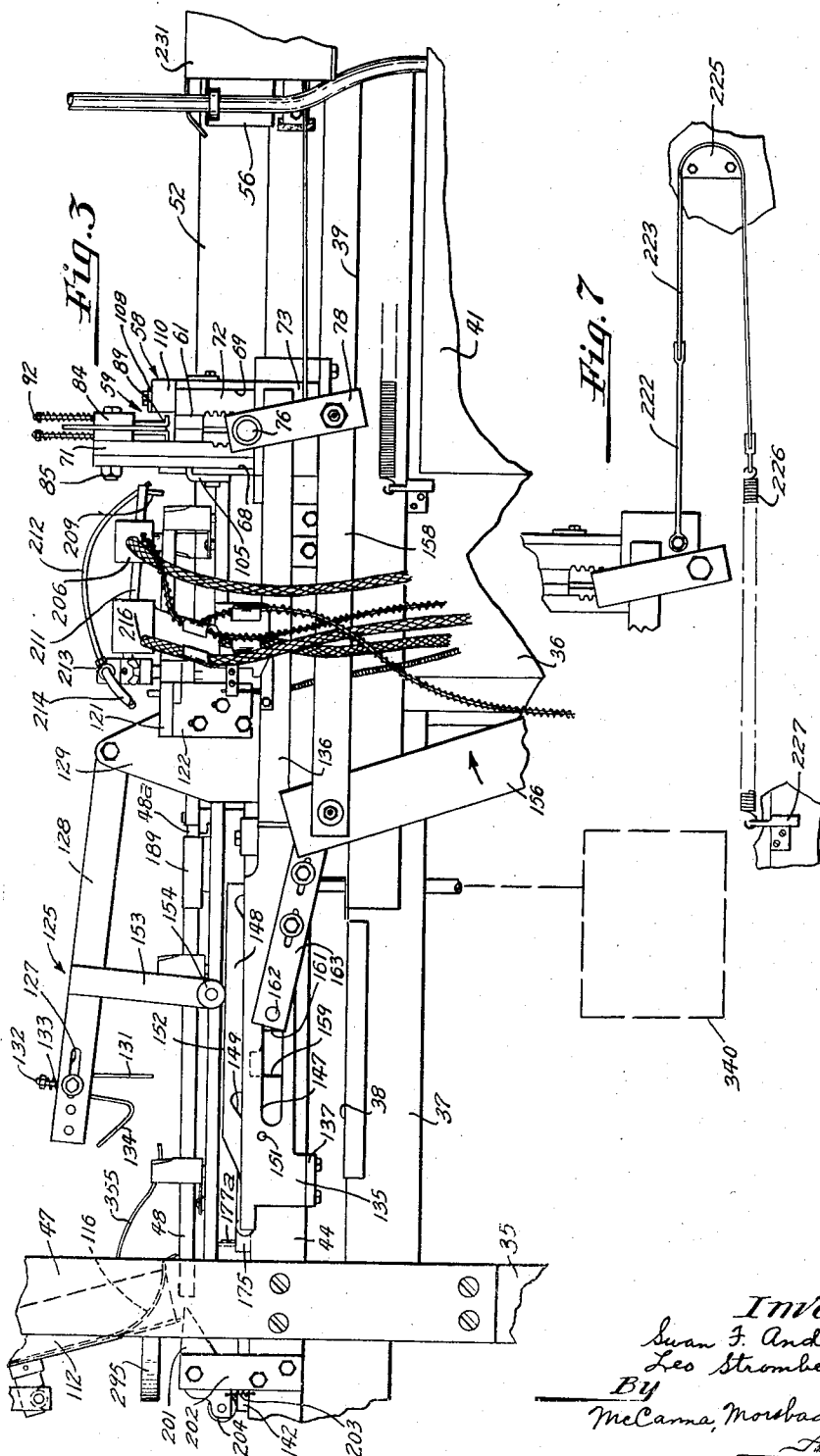
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2,918,769

WRAPPING MACHINE

Filed June 17, 1957

11 Sheets-Sheet 2



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Dec. 29, 1959

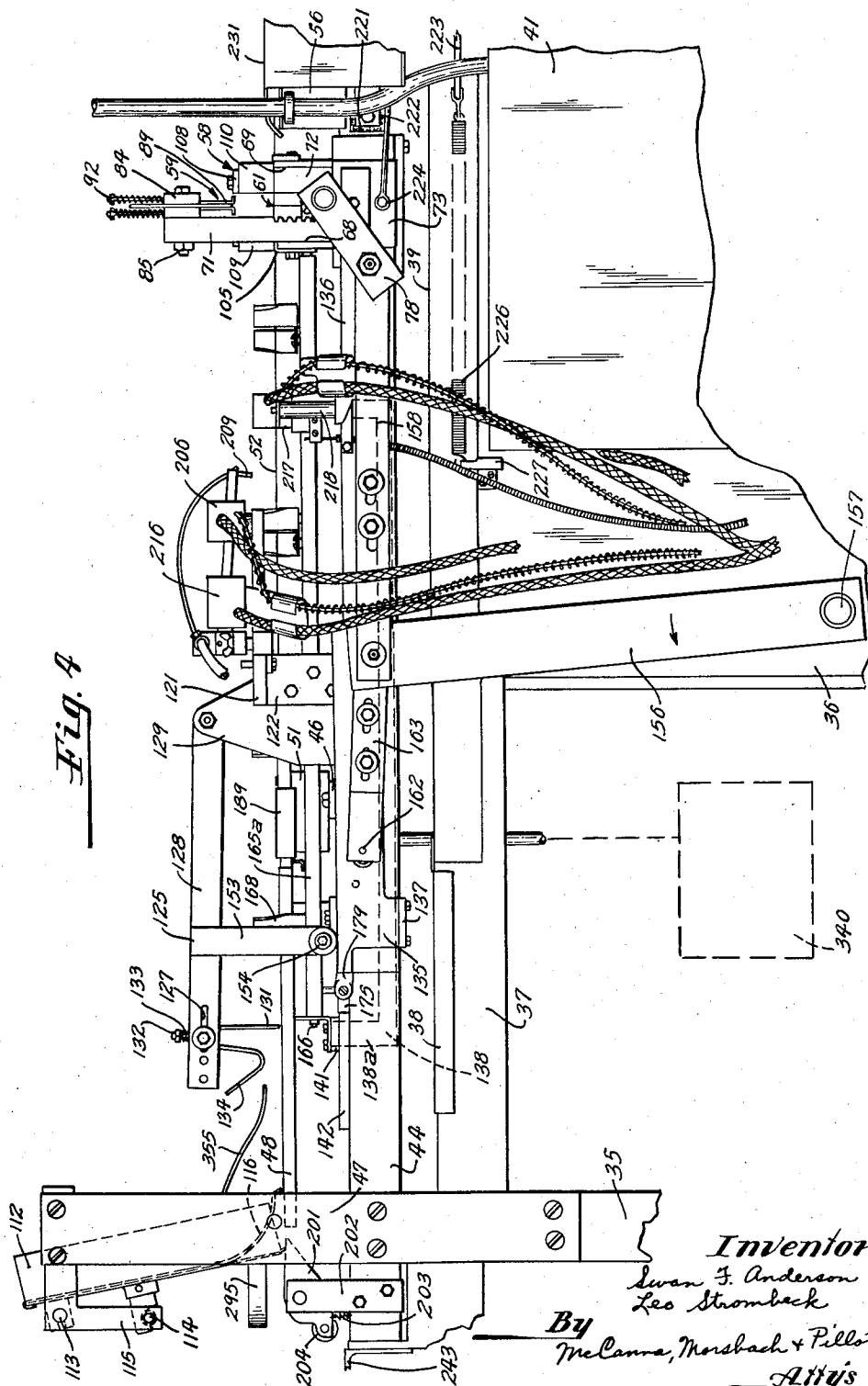
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WRAPPING MACHINE

Filed June 17, 1957

11 Sheets-Sheet 3



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WRAPPING MACHINE

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11 Sheets-Sheet 4

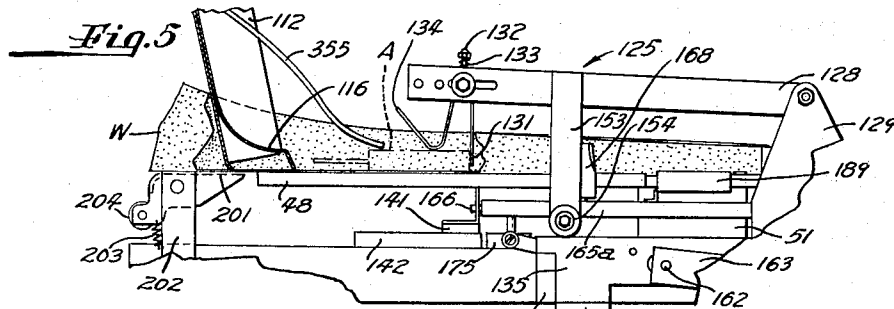
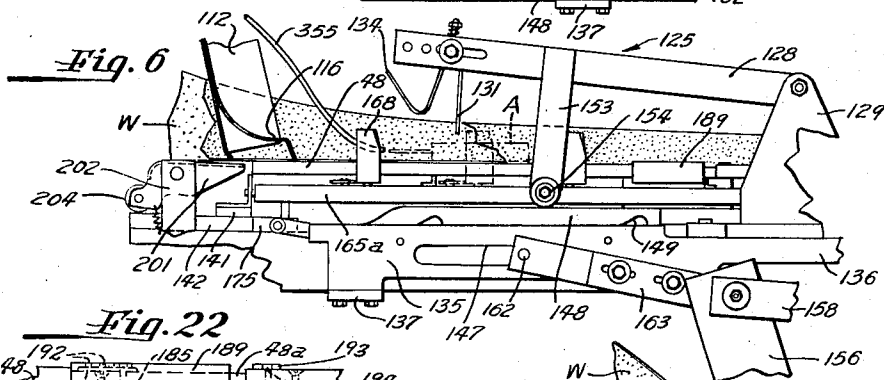
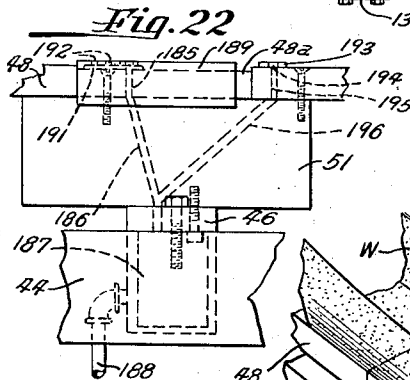
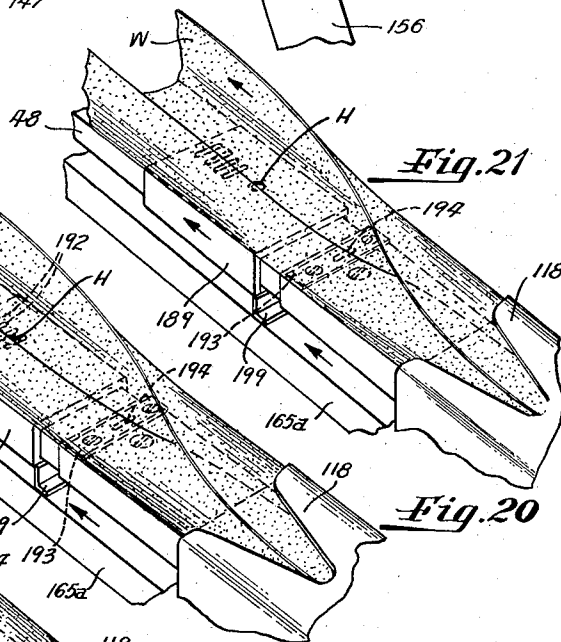
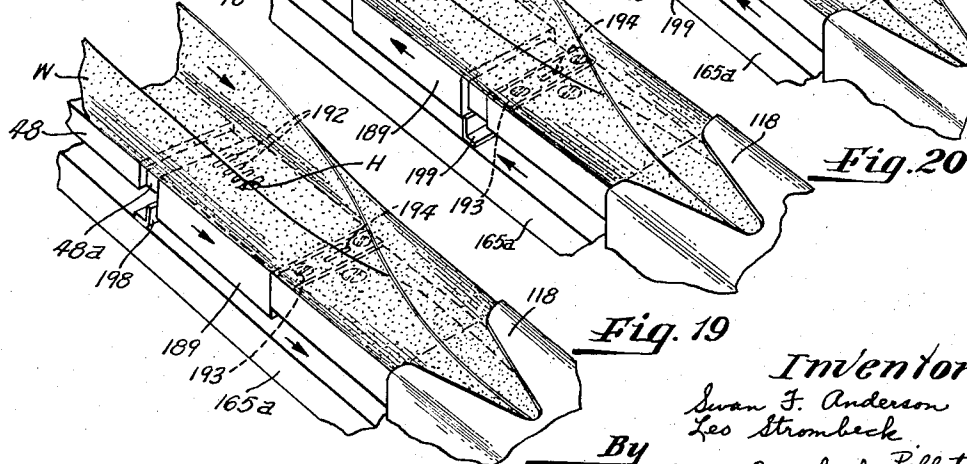


Fig. 19

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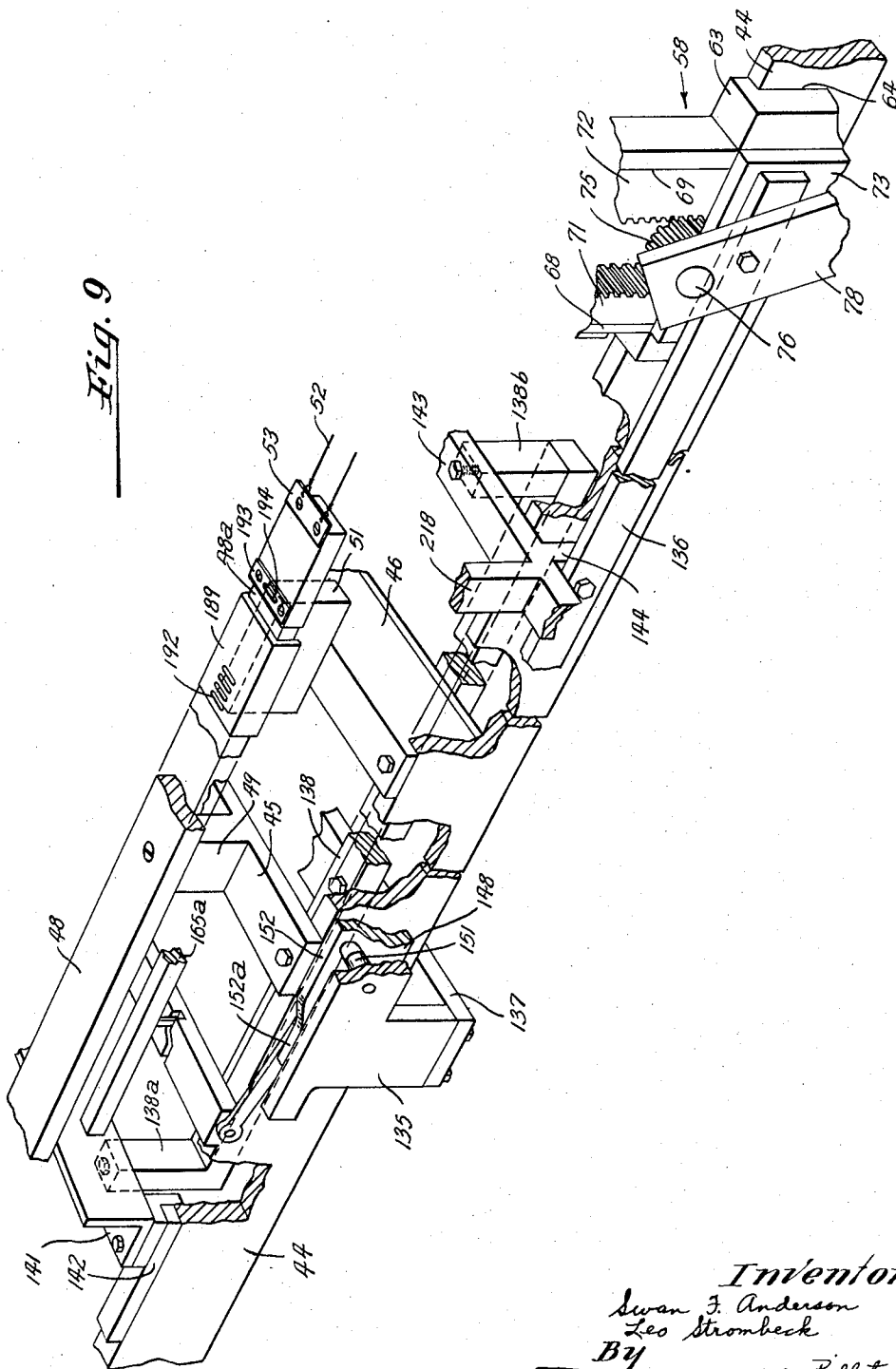
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Fig. 9



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Fig. 10

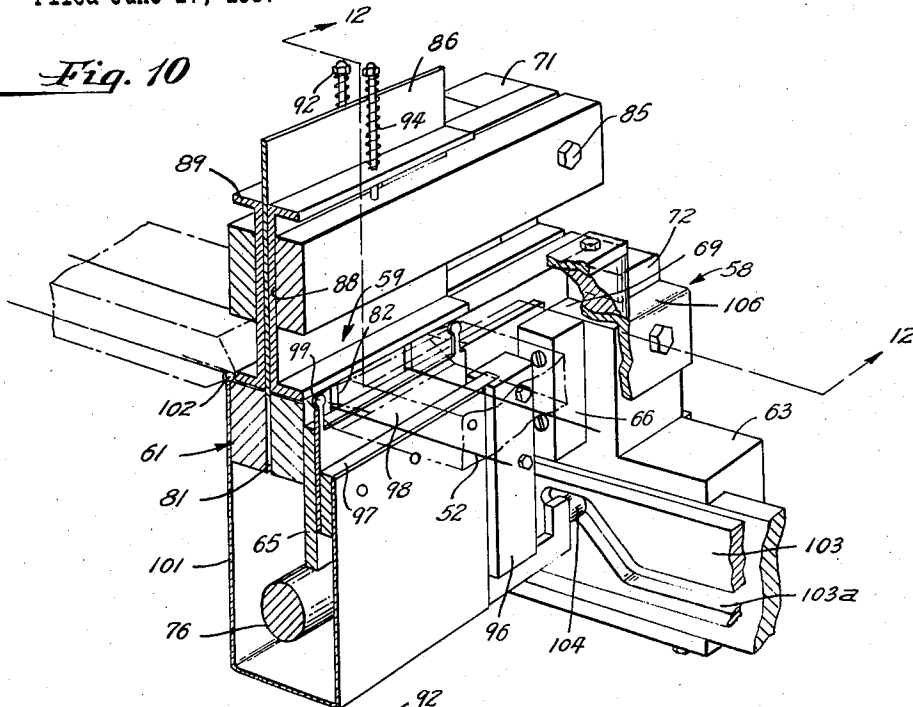
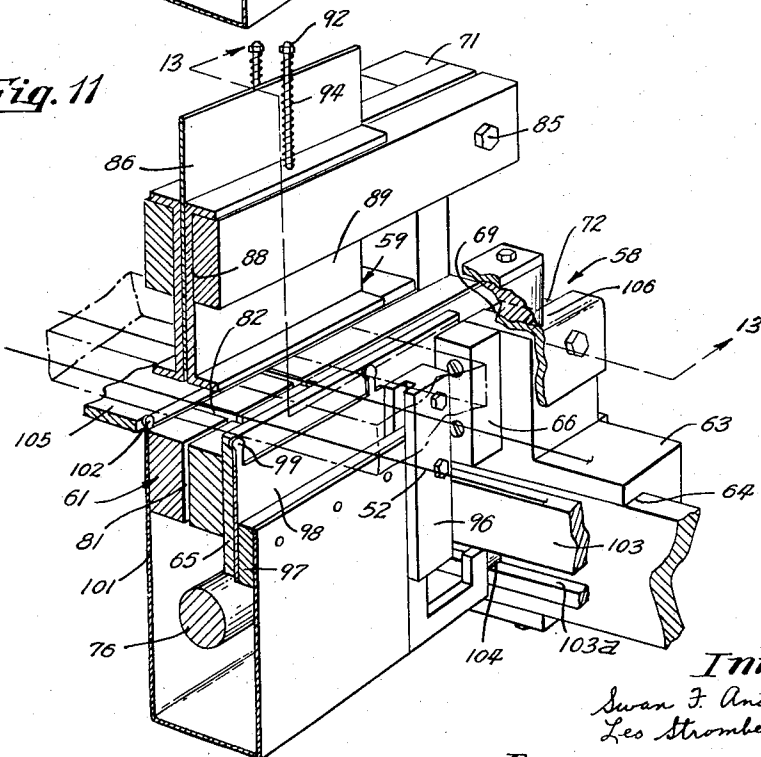


Fig. 11



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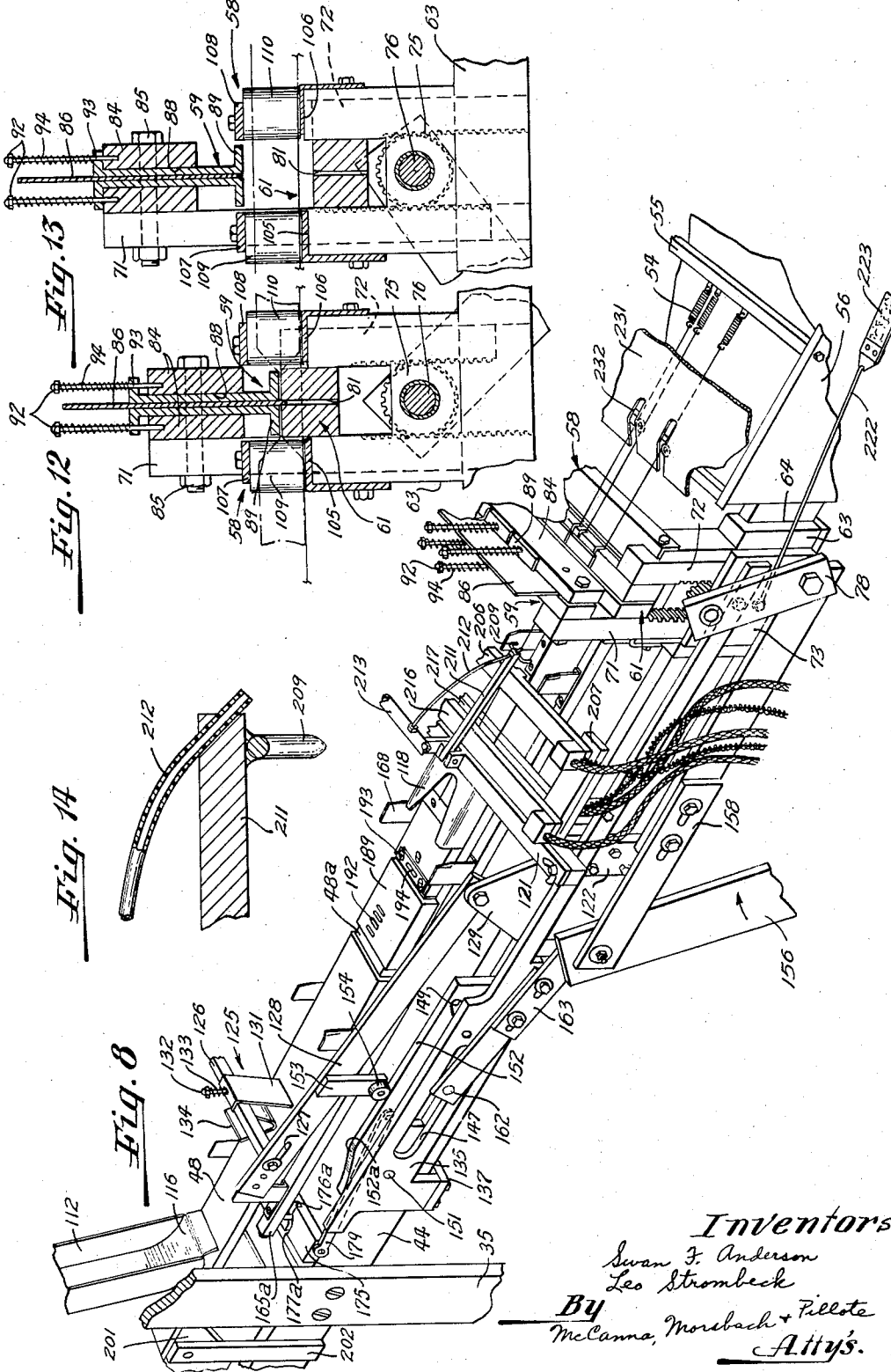
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Fig. 18

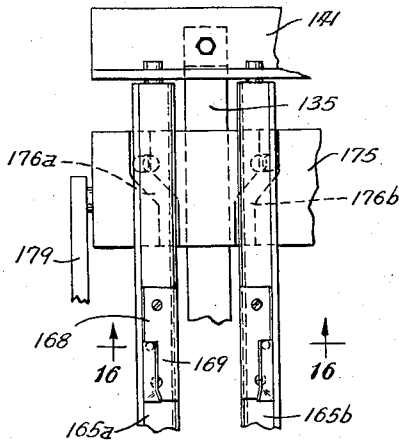


Fig. 17

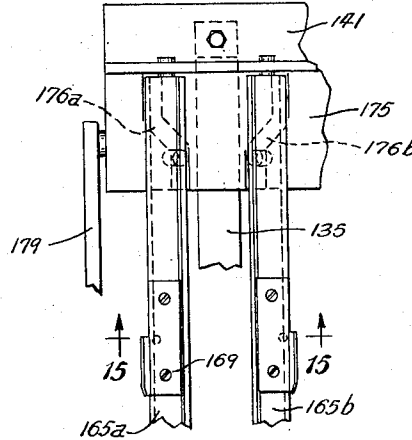


Fig. 16

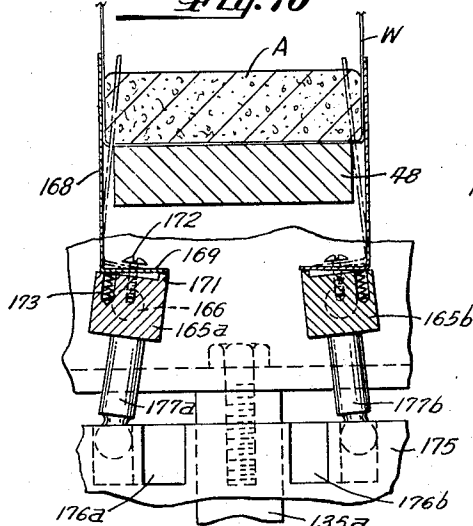


Fig. 15

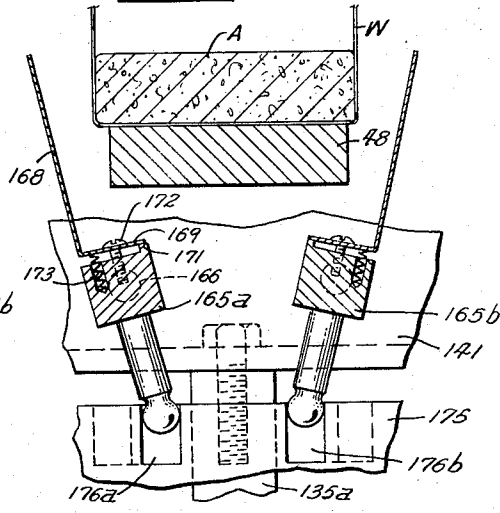
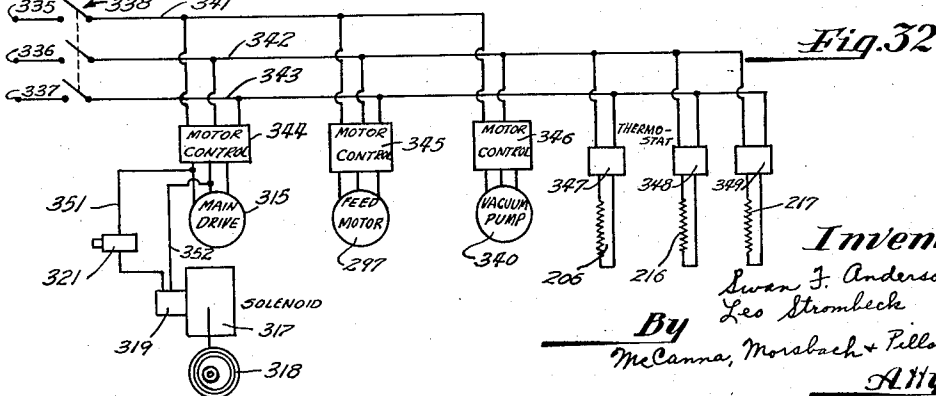


Fig. 32

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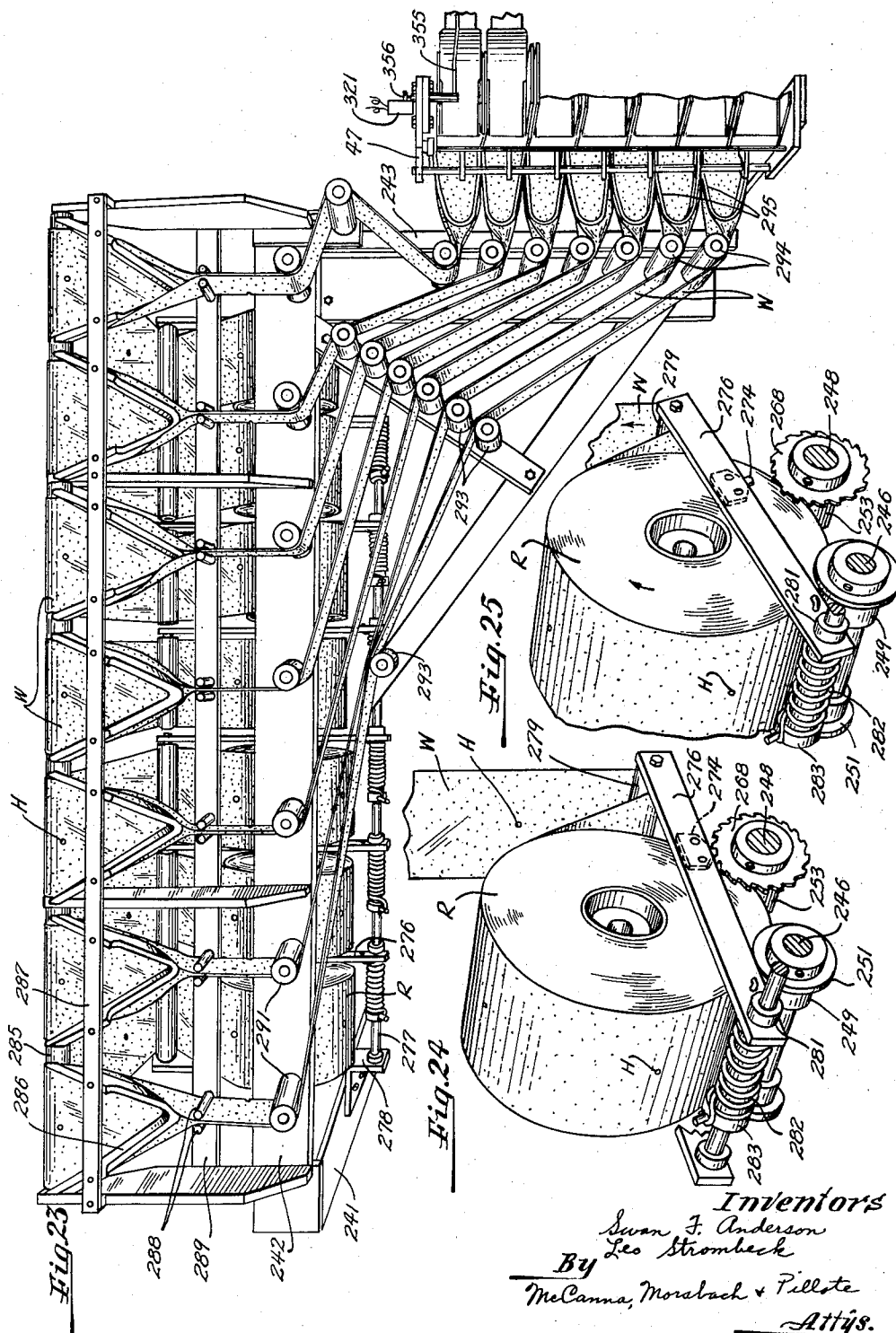
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Fig. 26

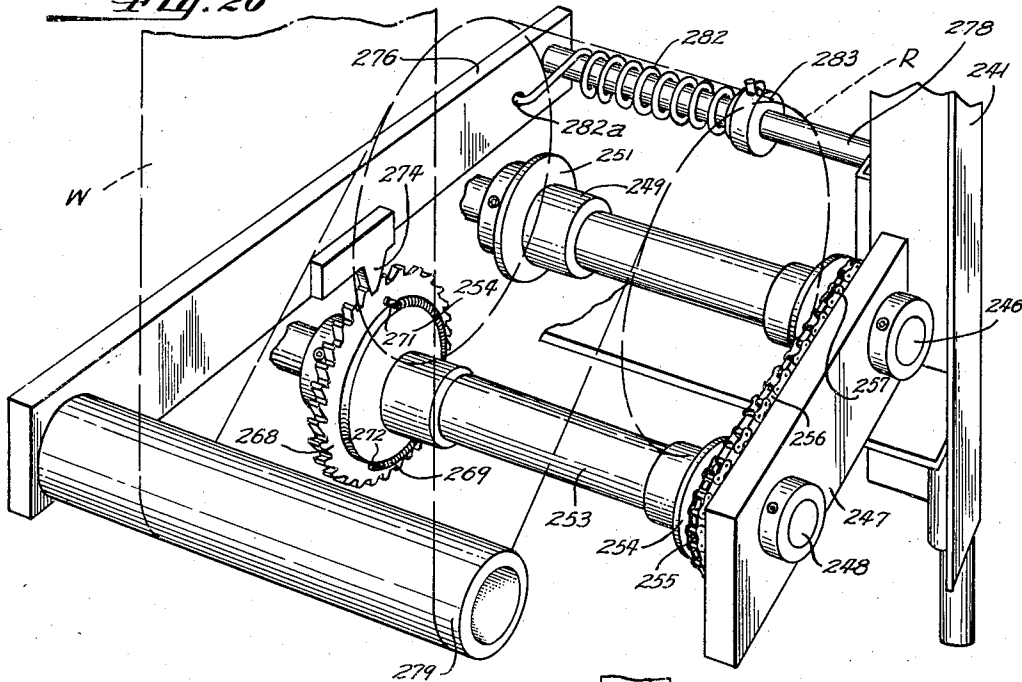
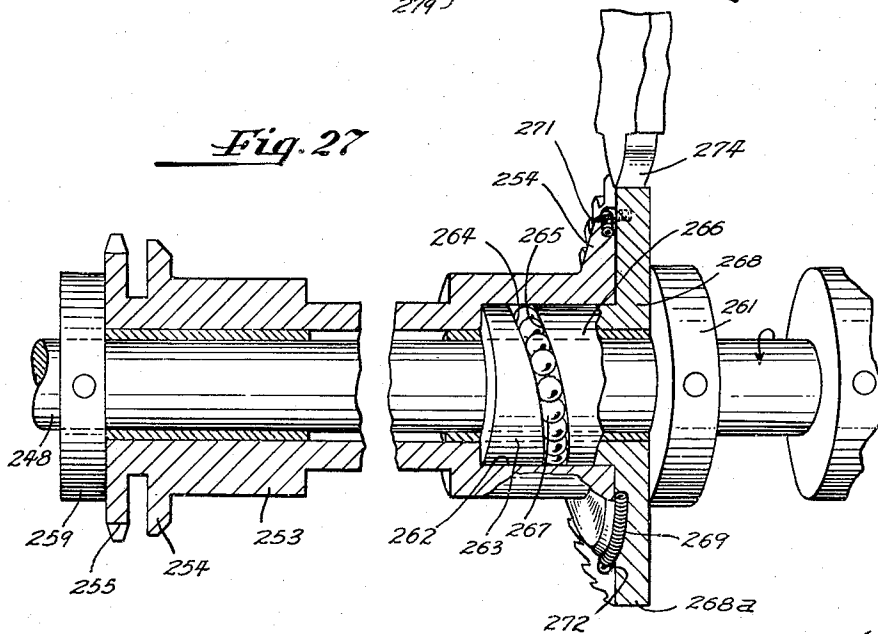


Fig. 27



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Fig. 28

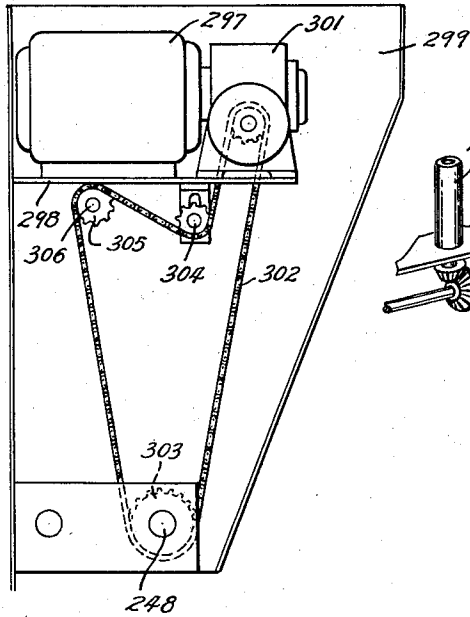


Fig. 29

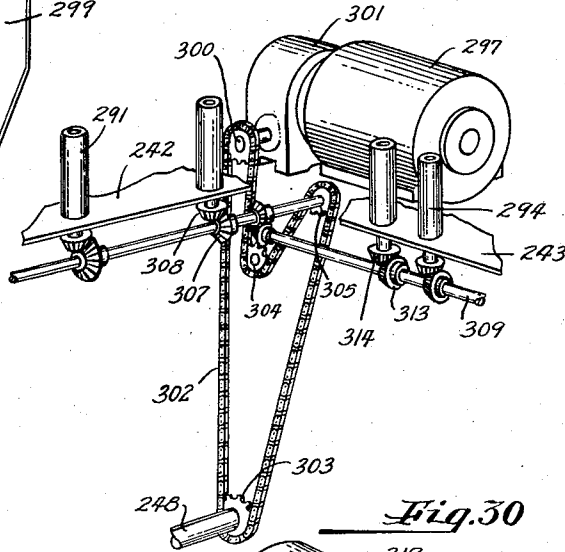


Fig. 30

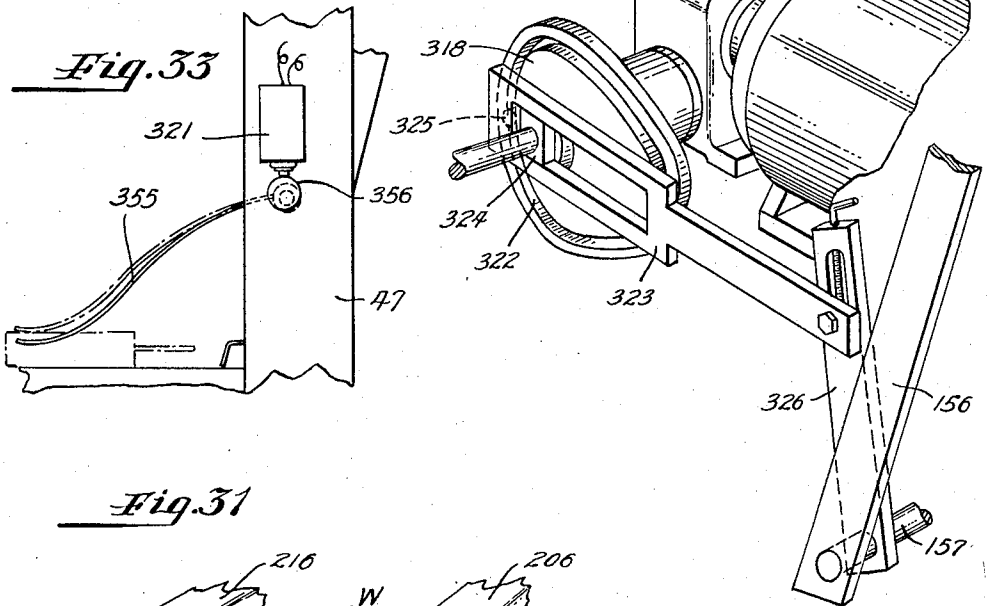


Fig. 31

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WRAPPING MACHINE

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Application June 17, 1957, Serial No. 665,933

30 Claims. (Cl. 53—178)

This invention relates to improved automatic packaging machines and particularly to a multiple lane wrapping and sealing machine.

An important object of this invention is to provide a multiple lane wrapping and sealing machine which enfolds a strip of wrapping material into a tube, advances the enfolded tube, seals the tube at longitudinally spaced points therealong and severs the sealed segments of the tube in timed relation to the feeding of articles to be wrapped onto the strip of wrapping material.

Another object of this invention is to provide a wrapping and sealing machine having an improved arrangement for advancing the strips of wrapping material horizontally past the article loading station and the strip enfolding mechanism.

A more particular object of this invention is to provide a wrapping and sealing machine having an improved arrangement for supporting the strips as they are advanced horizontally and an improved cutter and advancing mechanism having jaws located above and below the strip support, intermediate the ends of the support, which jaws are constructed and arranged to be moved into engagement at a point above the support to clamp and sever an end segment from the strip and which jaws are thereafter reciprocable longitudinally of the support to advance the strips therealong.

Yet another object of this invention is to provide a machine for wrapping and sealing articles having mechanism for intermittently advancing the strips of wrapping material and enfolding the strips into tubes around the article and means operated in timed relation with the advance of the strips for gripping the articles in the enfolded strips to prevent displacement of the articles relative to the strips as the latter are advanced.

A further object of this invention is to provide a machine for wrapping and sealing articles having mechanism for intermittently advancing the strips of wrapping material and enfolding the strips into tubes around the articles, together with stop means engageable with the articles fed onto the strips to properly position the same thereon and improved mechanism for operating the stop means in timed relation with the advance of the strips to prevent more than one article from moving past the stop means each time the strip is advanced.

Another object of this invention is to provide a multiple lane wrapping machine for enfolding printed strips of wrapping material around the articles to be wrapped and having improved means for correlating the advance of the strips through the machine with the printing on the strips so that the printing on each segment of the strip properly registers with the articles wrapped therein.

An additional object of this invention is to provide a multiple lane wrapping machine for intermittently advancing strips of wrapping material and enfolding the strips around the articles to be wrapped to form packages therefor, together with an improved arrangement for

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feeding the strips to the wrapping machine to prevent rupturing of the strip during the intermittent advance thereof.

Still another object of this invention is to provide a multiple lane wrapping and sealing machine in which the several lanes are spaced apart a distance less than the width of the strips of wrapping material to provide a compact wrapping and sealing machine together with an improved mechanism for feeding the strips of wrapping material to the machine.

A still further object of this invention is to provide a multiple lane wrapping and sealing machine for intermittently advancing strips of wrapping material and enfolding the strips into tubes around the articles to be wrapped, together with an improved mechanism for sealing the longitudinal seams of the enfolded strips and also at longitudinally spaced points therealong to form separate sealed packages.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings, wherein:

Figure 1 is a top view of the wrapping and sealing machine;

Figure 2 is a perspective view of a package formed by the machine;

Figure 3 is a fragmentary side elevational view of the wrapping and sealing machine illustrating the parts in their positions during extension of the strip advancing mechanism;

Figure 4 is a fragmentary side elevational view of the wrapping and sealing machine illustrating the parts in their positions during retraction of the strip advancing mechanism;

Figures 5 and 6 are fragmentary side elevational views of the wrapping and sealing machine illustrating operation of the article stop mechanism;

Figure 7 is a fragmentary side elevational view of the brake mechanism for retarding movement of the reciprocable strip feed mechanism;

Figure 8 is a fragmentary perspective view of one lane of the wrapping and sealing machine illustrating the parts in their positions during extension of the strip feed mechanism;

Figure 9 is a fragmentary perspective view of the wrapping machine, with parts broken away to illustrate details of construction;

Figures 10 and 11 are fragmentary perspective views of the cutting and sealing carriage and illustrating the mechanism in different operative positions thereof;

Figures 12 and 13 are vertical sectional views through the cutting and sealing carriage, taken on the planes 12—12 and 13—13 of Figs. 10 and 11, respectively;

Figure 14 is a fragmentary vertical sectional view through a hold-down clamp for forming the longitudinal seam on the folded strip;

Figure 15 is a fragmentary vertical sectional view taken on the plane 15—15 of Figure 4;

Figure 16 is a fragmentary vertical sectional view taken on the plane 16—16 of Figure 3;

Figure 17 is a fragmentary horizontal sectional view taken on the plane 17—17 of Figure 15;

Figure 18 is a fragmentary horizontal sectional view taken on the plane 18—18 of Figure 16;

Figures 19—21 are fragmentary perspective views of the mechanism for compensating for any over-feed of the wrapper strip to effect registry of the printing on the wrapper with the articles wrapped thereon, and illustrating the different operative positions thereof;

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Figure 22 is a fragmentary side elevational view of the strip over-feed compensating apparatus;

Figure 23 is a top plan view of the apparatus for feeding the strips of material to the wrapping and sealing machine;

Figures 24 and 25 are fragmentary perspective views of the roll drive mechanism, in different operative positions thereof;

Figure 26 is another fragmentary perspective view of the feed roll drive mechanism;

Figure 27 is an enlarged detailed view of the clutch mechanism for the roll drive;

Figure 28 is an end elevational view of the strip feed mechanism and illustrating the drive apparatus therefor;

Figure 29 is a perspective view of the drive apparatus of Figure 27;

Figure 30 is a fragmentary perspective view of the drive apparatus for the wrapping and sealing machine;

Figure 31 is a fragmentary perspective detailed view of the heater assembly for the sealing mechanism;

Figure 32 is a schematic wiring diagram for the wrapping and sealing machine, and

Figure 33 is a fragmentary perspective view of the clutch operating switch.

The wrapping and sealing machine of the present invention is adapted for wrapping a wide variety of different articles but will be specifically described herein with reference to the wrapping of frozen confections such as frozen bars and stick confections.

The wrapping and sealing mechanism is mounted on a base including uprights 35 and 36 having horizontally disposed stringers 37 secured thereto. Cover panels 38 and 39 are mounted on the stringers 37 and extend therebetween to provide a generally horizontally disposed table. Side panels 41 are provided on the base and define an enclosure therewith for the drive mechanism to be described more fully hereinafter.

A generally horizontally disposed frame, including spaced side members 44 and cross members 45 and 46 (see Figure 9), is mounted on the base in spaced relation to the table top. As shown in Figs. 3 and 4, one end of the side members 44 is secured to upright extensions 47, the other ends of the side members being suitably supported on the base by support members (not shown). As is apparent from Fig. 9, the cross members 45 and 46 are secured to the upper edges of the side members 44 and extend therebetween.

The strips of wrapping material W are supported during their movement through the machine on support bars 48 which are mounted on upright projections 49 on the cross member 45 and on a block 51 on the cross member 46 (see Fig. 9). The support bars 48 extend longitudinally of the frame to a point intermediate the ends thereof. The wrapper strips after leaving the support bars 48 are supported on spaced wires 52 which are attached at one end thereof by a bracket 53 to the end of the respective support bar and at the other end thereof by springs 54 (see Figs. 1 and 8) to a cross piece 55 disposed above the frame members 44 and rigidly secured thereto by brackets 56. In this manner, the strips of wrapping material are supported throughout their movement through the machine on the bars 48 and wires 52, it being apparent that one such support assembly is provided for each of the different lanes of the multiple lane wrapping machine, herein shown as a seven-lane wrapping machine.

Strip advancing and cutting mechanism

A carriage 58 is mounted on the side members 44 of the frame for reciprocation longitudinally thereof and carries upper and lower jaws 59 and 61 which are vertically movable into and out of engagement with each other to clamp the strip of wrapping material therebetween and advance the strip as the carriage is extended. As best shown in Figs. 12 and 13, the carriage includes a pair of castings 63 each having a horizontally extending

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guide way 64 formed on the inner face thereof for slidably receiving the side member 44 of the frame. A cross piece 65 is secured to a block 66 on the castings 63 and extends therebetween to rigidly secure the castings to each other.

The castings 63 also have vertically disposed guideways 68 and 69 formed in the outer faces thereof for slidably receiving the forward and rear racks 71 and 72 which carry the upper and lower jaws 59 and 61, respectively. A cover plate 73 is secured to the casting and overlies the guideways 68 and 69 to slidably retain the racks 71 and 72 therein and a pinion gear 75 is mounted on a shaft 76 which is rotatably supported in the casting 63 and extends therebetween, as is clearly shown in Figures 10 and 11. The gear 75 meshes with the racks 71 and 72 and an operating arm 78 is attached to the shaft 76 to rotate the gears 75 and simultaneously reciprocate the racks in relatively opposite directions.

The lower jaw member 61 is secured to the upper ends of the racks 72 at opposite sides of the frame and extends therebetween. The lower jaw has a vertically disposed slot 81 formed therein which extends longitudinally of the lower jaw. The slot 81 in the jaw may conveniently be formed by using two separate bars which are secured to the racks 72 and maintained in spaced relation to each other by suitable spacers (not shown) located adjacent the lower edges of the bars. A plurality of vertically disposed transverse slots 82 (see Figs. 10 and 11) are also formed in the lower jaw 61 and spaced apart to receive the support wires 52, as the lower jaw is raised and lowered relative to the support wires.

The upper jaw 59 includes a pair of spaced bars 84 which are secured, by fasteners 85 to the upper ends of the forward racks 71 and extend therebetween crosswise of the machine. A cutter blade 86 is disposed between the bars 84 and rigidly secured thereto by a plurality of pins 87 which extend between the bars 84 and through the cutter blade. The bars 84 have recesses 88 formed in the registering faces thereof between the pins 87 to provide guideways on opposite sides of the cutter blade 86 and above each of the several strips of wrapping material. A pair of generally channel-shaped jaw members 89 have the web portions thereof slidably received in the guideways or recesses 88, in back to back relation at opposite sides of the cutter blade 86. A plurality of pins 92, one for each of the jaw members 89, are secured to the bars 84, as by threaded engagement therewith, and slidably extend through openings 93 in the upper legs of the jaw members 89. A compression spring 94 is disposed around each of the pins 92 between the head thereon and the upper leg of the jaw members to normally urge the latter downwardly relative to the bars 84 until the upper leg of the jaw members abuts against the bars 84. In their lowermost position, illustrated in Figs. 11 and 13, the jaw members 89 extend below the lower edge of the cutter blade 86.

The upper and lower jaws are thus movable towards each other in response to rotation of the shaft 76, in a counterclockwise direction as viewed in Figure 4, the lower jaw moving upwardly to a level above the wrapper strip support wires 52 and the upper jaw moving downwardly until the lower legs of the jaw members 89 clamp the strip of wrapping material therebetween. Further movement of the upper and lower jaws produces relative movement between the jaw members 89 and the blade 86 to effect movement of the cutter blade into the slot 81 in the lower jaw to thereby sever the strips of wrapping material.

Provision is made for tucking the sides of the end folded wrapper inwardly as the cutter jaws are moved towards each other to seal and clamp the strip of wrapping material. For this purpose, a pair of vertically disposed guideways 96 (see Figs. 10 and 11) are mounted on the carriage for movement therewith and are herein shown attached to the cross member 65 of the carriage.

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A bar 97 is slidably mounted in the guideways 96 at opposite sides of the machine and extends therebetween and a rear tucker plate 98 is attached to the bar 97 for movement therewith and carries upstanding fingers 99 arranged to engage the enfolded wrapper adjacent opposite sides thereof. A forward tucker plate 101 is also mounted on the bar 97 for movement therewith and, as shown, has a generally U-shaped cross-section to underlie the shaft 76 in all operative positions of the forward tucker plate. Similar tucker fingers 102 are provided at the upper edge of the forward tucker plate and engage opposite sides of the enfolded wrapper at a point in advance of the cutting and sealing mechanism. A mechanism including the cam plate 103, attached to the inner faces of the frame members 44, and a follower 104, operatively connected to the cross-bar 97, is provided for raising and lowering the tucker plates 98 and 101.

A pair of lower stripper bars 105 and 106 (see Figs. 12 and 13) are attached to the castings 63 and extend crosswise of the machine and underlie the support wires 52 to aid in separating the strip of wrapping material from the lower jaw as the latter is moved downwardly to a level below the lower stripper bars. A pair of upper stripper bars 107 and 108 are mounted on blocks 109 and 110 on the upper edges of the castings and overlie the enfolded strip of wrapping material to aid in removing the latter from the upper jaws 59, as the upper jaws are raised. In order to facilitate illustration of the other parts of the cutting and sealing mechanism, the upper stripper bars 107 and 108 and the supporting blocks therefor have not been shown in Figs. 8, 10 and 11.

The articles to be wrapped are delivered onto the strips of wrapping material W carried on the support bars 48 by means of a plurality of chutes 112 having a channel-shaped cross-section and which are mounted on transverse rods 113 and 114 carried by a bracket 115 attached to the upright extensions 47 (see Fig. 4). The chutes are inclined downwardly and forwardly in the direction of movement of the strips of wrapping material and have a curved lip 116 at the bottom thereof which overlies the end of the respective support bar 48. Apparatus to be described more fully hereinafter is provided for channeling the strips of wrapping material around the lower ends of the chutes 112, as the strips are drawn thereby, and the articles from the chutes 112 are deposited in the channel strips W resting upon the support bars 48. A folding shoe or blade 118 (Figs. 1 and 8) is mounted between the carriage 58 and the chutes 112 to overlie each of the support bars 48 and fold the sides of the channeled wrapper strip over each other around the articles to be wrapped. As shown in Figs. 19-21, the side of the wrapper which is at the left is folded against the article while the side of the wrapper which is at the right is folded on top of the inwardly folded margin from the left. The several folding shoes 118 are supported on a common cross member 121 which is attached, as by brackets 122 to the stationary frame members 44.

Article stop mechanism

A mechanism 125 is provided for stopping the articles A on the wrapper W to properly locate the same thereon and provision is made for operating the stop mechanism in timed relation with the advance of the wrapper to effect uniform spacing of successive articles along the strip of wrapping material. The stop mechanism is positioned to overlie the wrapper support bars 48 and includes a transverse bar 126 (see Figs. 1 and 8) extending crosswise of the machine and having the ends thereof adjustably mounted in slots 127 on the levers 128 for adjustment longitudinally of the latter. The levers 128 are pivotally supported at the other ends thereof on brackets 129 which is rigidly secured to the side frame members 44 at opposite sides of the machine and extend

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upwardly therefrom. The stop members each include a depending lip 131 which is yieldably supported by a pin and spring arrangement 132 and 133, respectively, on the cross bar 126. A generally V-shaped presser foot 134 is provided on the stop plate 131 and projects forwardly therefrom.

An apparatus is provided for raising and lowering the article stop mechanism in timed relation with the operation of the wrapper strip advancing mechanism and is so arranged as to raise the stop mechanism before extension of the carriage 58 and to lower the stop mechanism when the carriage has reached its extended position and before retraction of the carriage is initiated. More specifically, a guide plate 135 is mounted for reciprocation longitudinally of the frame 44 and has a connector bar 136 attached to or formed integrally therewith, which connector bar is secured to the carriage 58 to effect reciprocation of the guide plate with the carriage. As is apparent, the carriage supports one end of the guide plate and connector bar assembly. The other end of the assembly is supported by means of a cross bar 137 attached to the guide plate and underlying the frame members 44. The cross bar 137 is secured to longitudinally extending tie bars 138 (see Fig. 9) which underlie the cross members 45 and 46 and have upturned ends 138a and 138b. The forward end of the tie bar 138 is secured to a crosspiece 141 which is slidably supported by a guide block 142 on the side frame members 44. The other end of the tie bar 138 is attached to a crosspiece 143 having a depending ear 144 thereon which is attached to the connector bar 136. In this manner, the guide plate 135 is slidably supported on the frame members 44 and is spaced laterally therefrom. An elongated slot 147 is formed in the guide plate, for purposes to be described more fully hereinafter.

A cam plate 148 is formed with longitudinally spaced cam slots 149, which cam slots extend upwardly and rearwardly, as is shown in Figs. 3 and 6. The cam plate 148 is interposed between the guide plate 135 and the adjacent frame member 44 and follower pins 151 are mounted on the guide plate and extend into the cam slots 149 to support the cam plate on the guide plate. The upper edge of the cam plate 148 is formed with a cam track 152 having a well portion 152a adjacent the forward end thereof and a follower including a depending arm 153 and roller 154 is provided on the lever 128 to effect raising and lowering of the latter in response to vertical movement of the cam plate.

The cam plate 148 is thus mounted on the guide plate for movement therewith and for limited longitudinal and vertical movement relative thereto and mechanism is provided for moving the cam plate relative to the guide plate in timed relation to the movement of the carriage 58 to effect raising and lowering of the article stop mechanism. In particular, a common operating lever 156 is operatively connected to the arm 78 on the cutting and sealing mechanism and also to the cam plate 148 to sequentially open the clamping jaws 59 and 61, retract the carriage 58, close the jaws 59 and 61 and extend the carriage. The mechanism is arranged to effect raising of the cam plate 148 prior to extension of the carriage to permit the articles on the wrapper W to move therewith and for lowering the cam plate 152 after the article has passed below the article stop finger 131, to stop the succeeding articles. As shown in Figure 4, the lever 156 is attached to a shaft 157 on the base of the machine and has the upper end thereof connected by an adjustable link 158 to the end of the arm 78 on the cutting and sealing mechanism. As best shown in Figure 3, the cam plate 148 has a generally L-shaped slot 159 formed therein, the horizontal leg of which extends longitudinally of the plate and the vertical leg of which extends upwardly from the forward end of the slot. A slide block 161 is slidably received in the slot 159 and is connected by a pin 162 to one end of an adjustable link

163. The other end of the link 163 is connected to the upper end of the lever 156, for movement thereby.

The operational sequence will be best understood by referring to Figs. 1, 3, 4, 5 and 6. The carriage is normally in its extended position shown in Fig. 1 with the clamping jaws 59 and 61 closed. The cam plate 148 is in its raised position but the stop arm follower 154 rests in the well 152a on the cam plate 152 so that the article stop fingers are lowered.

When the lever 156 is initially moved in a counterclockwise direction, the lever operates through link 158 to move the arm 78 in a clockwise direction and effect opening of the jaws 59 and 61. Simultaneously, the lever 156 operates through link 163 to move the guide block 161 to the left as viewed in Figs. 4 and 5. Since the carriage is stationary during the initial closing movement of the jaws 59 and 61, it is apparent that the guide block 161 will move the cam plate 148 relative to the guide plate, in a direction to the left as shown in Figs. 4 and 5. The cam plate, which is supported on the follower pins 151, will be cammed downwardly as it is moved relative to the guide plate causing the guide block 161 to move out of the horizontal leg and into the vertical leg of the cam slot 159.

Further movement of the operating lever 156 in a counterclockwise direction, after opening of the clamping jaws 59 and 61, will effect movement of the carriage in a direction to the left as viewed in Figure 4 to retract the carriage to its forward position. Since the guide plate is supported for movement with the carriage, the guide plate and the cam plate carried thereby will be moved longitudinally of the frame. The roller on the follower arm 153 will ride along the cam surface 152 on the upper edge of the cam plate and maintain the article stop in its lowered position until the carriage reaches its retracted position.

When the lever 156 is thereafter moved in a clockwise direction, the link 158 operates the arm 78 to close the clamping jaws. During this initial movement of the lever 156, in a clockwise direction, the link 163 moves the guide block 161 to the right as viewed in Figs. 3 and 6. Since the guide plate 135 is stationary, during this initial movement of the lever, the guide block will move the cam plate 148 to the right relative to the guide plate whereby the cam plate is cammed upwardly by the followers 151 until it reaches a raised position in which the guide block moves out of the vertical leg of the cam slot at which time further movement of the cam plate relative to the guide plate is interrupted. Further movement of the lever 156 after the jaws 59 and 61 have closed, moves the guide plate 135 and cam plate 148 longitudinally of the frame with the cam plate and stop fingers in a raised position until the carriage approaches its extended position. At that time, the follower on the arm 152 rides downwardly on the well portion 152a of the cam plate to lower the article stop.

Article gripping mechanism

Provision is made for gripping the articles in the wrapper W as the latter is advanced to prevent displacement of the articles relative to the wrapper. This is particularly essential when handling frozen confections which tend to melt slightly when contacting the relatively warm wrapper. The article gripping means includes a pair of elongated rocker bars 165a and 165b disposed below each of the wrapper supports 48 and adjacent relatively opposite sides thereof. The rocker bars are supported at their forward ends by pins 166 which are rotatably received in the upstanding leg on the crosspiece 141 and at the rear ends on the depending leg of the forward lower stripper bar 105 (see Figs. 3 and 4), for rotary movement about the longitudinal axis thereof. A plurality of article gripping fingers 168 are mounted on each of the bars, at longitudinally spaced points therealong corresponding to the length of the packages to be formed by the machine, and arranged for movement with the

rocker bars into and out of engagement with opposed sides of the wrapper W to grip the wrapper and the article disposed therein and prevent displacement of the article relative to the wrapper. As best shown in Figures 15 and 16, the article gripping fingers have an inwardly extending leg 169 on the lower end thereof which is supported at its inner edge on an upstanding flange 171 on the rocker bar. A headed pin 172 is threaded into the rocker bar and loosely extends through an opening in the leg 169 to retain the gripping fingers on the rocker bars. A spring 173 is mounted on the rocker bar and engages the leg 169 at a point spaced from the flange 171 to normally urge the leg 169 away from the rocker bar and against the head on the pin 172, as shown in Figure 16. When the rocker bars are rotated to move the fingers 168 against the wrapper, as shown in Figure 16, the springs 173 yield to resiliently hold the fingers against the wrapper and the article contained therein.

The rocker bars 165a and 165b are thus connected to the carriage 58 and are movable therewith longitudinally of the frame 44. A cam mechanism is provided for rotating the rocker bars in relatively opposite directions to move the article engaging fingers out of engagement with the wrapper before the carriage begins movement toward its retracted position and to rotate the rocker bars in the opposite direction to engage the wrapper after the carriage reaches its retracted position and before extension of the carriage is initiated. In the present application, this is conveniently effected by the same mechanism utilized for operating the article stop mechanism. More particularly, the transverse cam plate 175 is slidably supported on the upper edges of the frame members 44 for movement longitudinally thereof and relative to the crosspieces 141. As best shown in Figures 17 and 18, the transverse cam plate 175 has cam grooves 176a and 176b therein and followers 177a and 177b are provided on the rocker bars 165a and 165b, respectively, and have spherical ends which engage the cam grooves 176a and 176b. The cam grooves 176a and 176b have relatively converging portions so that the rocker bars are rotated in a direction to move the fingers 168 thereon into engagement with the wrapper, when the cam plate 175 is moved relative to the rocker bars in a direction extending downwardly as viewed in Figure 17 and to the right as viewed in Figure 4. When the transverse cam plate 175 is moved in the relatively opposite direction, the rocker bars are moved to swing the article engaging fingers 168 away from the wrapper.

As previously described, the cam plate 148 for operating the article stop mechanism is mounted for movement with the guide plate 135 and carriage 58 and for limited movement relative thereto in a direction longitudinally of the machine. Moreover, the cam plate 148 is moved relative to the guide plate by the lever 156 and link 163 in a direction to the left as viewed in Figure 4, before the carriage begins movement towards its retracted position and the cam plate 148 is moved to the right relative to the guide plate, after the carriage reaches its retracted position and before extension of the carriage is initiated. The transverse cam plate 175 is advantageously operated in response to movement of the cam plate 148 and for this purpose there is provided a link 179 which is pivotally connected at one end to the end of the transverse cam plate 175 and at the other end to the cam plate 148, as is best shown in Figure 8. In this manner the transverse cam plate is operated in response to movement of the cam plate 148 to release the fingers 168 when the carriage is retracted and to effect gripping of the article and wrapper between the fingers 168, when the carriage is extended to advance the strip of wrapping material.

Wrapper feed synchronizing apparatus

In wrapping articles it is frequently desirable to use a printed wrapper and to properly locate the article with respect to the printing on the wrapper. Since the length

of the wrapper will change with variations in temperature and humidity, it is necessary to control the feeding of the wrapper in accordance with some indicia thereon. In the present apparatus, the carriage 58 and the mechanism for extending and retracting the latter is arranged so as to advance the strip of wrapping material a distance slightly in excess of the length of one of the individual wrappers in the strip and provision is made for retracting the wrapper strip, after advancement of the latter, a distance sufficient to accommodate the overfeed of the wrapper strip, as determined by an indicia on the strip. In particular, the strips of wrapping material W are provided with longitudinally spaced openings H (see Figs. 19-21) which are spaced apart a distance corresponding to the length of the wrapper and preferably located at the end of the packages to be formed from the wrapper strip.

The wrapper feed synchronizing mechanism is best shown in Figures 19-22. Referring first to Figure 22, there is shown a passage 185 in the wrapper strip support bar 48 disposed intermediate the side edges thereof and communicating through a passage 186 in the block 51 with a vacuum chamber 187 formed in the cross member 46 and extending between the frame members 44. The vacuum chamber is connected through a conduit 188 with a vacuum pump or the like which maintains a chamber 187 at a low pressure. A slide 189 is slidably supported on a recessed portion 48a of the support bar 48 and overlies the upper end of the passage 185 therein. The slide 189 has an elongated recess 191 formed in the underside thereof adapted to communicate with the passage 185 in the support bar and a plurality of openings 192 are formed in the upper face of the slide. As is apparent, the strip of wrapping material W overlies the openings 192 in the slide and is firmly held against the slide when none of the holes H in the wrapper register with the openings 192 so that the wrapper will normally move with the slide 189. However, when one of the openings H registers with the openings 192 in the slide, the vacuum is broken so that the wrapper is not firmly held against the slide. A hold down plate 193 having a passage 194 therein is preferably provided at the upper face of the support bar 48 and communicated through passages 195 and 196 with the vacuum chamber 187 so as to draw the wrapper strip downwardly against the bar and thereby assure that the wrapper will closely overlie the slide 189. The slide 189 is moved forwardly a short distance when the wrapper W is extended or advanced and is thereafter moved rearwardly to its initial position after the clamping jaws 59 and 61 have opened and the article engaging fingers 168 have been moved to their released position, to thereby retract the wrapper strip W a short distance, if one of the holes H does not register with the openings 192 in the slide. As best shown in Figures 19-21, a forward slide engaging finger 198 is mounted on each of the rocker bars 165a and 165b and arranged to engage the slide just before the carriage reaches its extended position, to extend the slide therewith, as shown in Figure 19. A rear slide engaging finger 199 is also mounted on each of the rocker bars 165a and 165b and arranged to engage the slide 189, just before the carriage reaches its retracted position, to thereby retract the slide 189 with the carriage, as shown in Figures 20 and 21. The effective length of the openings or ports 192 in the slide is made at least equal to the distance through which the slide is reciprocated. If one of the holes H overlies one of the openings 192 in the slide 189, when the slide is in its extended position, the vacuum is broken so that the slide merely moves relative to the wrapper strips until the openings 192 move out of registry with the holes H in the wrapper. When the slide is retracted to a position in which one of the holes H in the wrapper strip does not overlie the openings 192, then the vacuum will hold the wrapper W tightly against the slide so that further retraction of the slide as shown in Figure 21, will retract the wrapper W there-

with. Thus, when one of the holes H overlies the openings 192 when the slide is in its extended position, the slide operates to retract the strip a distance sufficient to bring the hole H to a position in which it is just out of registry with the openings 192, when the slide is retracted. If the hole H does not register with the openings 192 when the carriage is in its extended position, then the slide will operate to retract the strip W the full distance through which the slide is retracted each time the slide is reciprocated, until the hole H does register with the openings 192 when the slide is in its extended position. It is apparent that the effective length of the openings 192 in the slide must be at least equal to the distance through which the slide is reciprocated, to effect proper operation. During the extension of the carriage, the clamping jaws positively grip the enfolded wrapper W therebetween and draw the wrapper W over the slide. The vacuum is insufficient to hold the wrapper W against the positive advance of the wrapper by the carriage. However, during retraction of the carriage, the clamping jaws 59 and 61 are open and the article engaging fingers 168 are in their released position so that the slide 189 only has to overcome the friction of the wrapper W in order to retract the same.

A wrapper strip tensioning jaw 201 is pivotally mounted on a bracket 202 carried by the frame members 44 and undersides the lower end of the chutes 112, as is clearly shown in Figures 5 and 6, to clamp the wrapper W therebetween. As is apparent, the pivot point of the jaw 201 is disposed forward of the lower edge of the chute 112 so that the jaw will yield under the bias of the spring 203 to permit the paper to be advanced therebetween. In order to release the clamp jaw 201, when the slide 189 is operated to retract the paper, a roller 204 is mounted on the clamp jaw 201 at the side of the pivot pin opposite the wrapper engaging portion, and the slide block 142 is arranged to engage the roller, as the carriage is moved to its retracted position and at substantially the same time that the rear finger 199 engages the slide 189, to thereby move the clamp jaw to its released position and permit the wrapper W to be retracted if one of the holes H does not properly align with one of the openings 192 in the slide.

The wrapper W is preferably heat sealable and may either be formed of a heat sealable material or pre-coated with a heat sealable material at least at the longitudinal and cross seams. A heater 206, preferably thermostatically controlled, is mounted on an arm 207 carried by the bracket 122, and which heater overlies the enfolded strips of wrapping material between the enfolding shoe 118 and the cutter and sealing mechanism 58. The heater 206 is preferably formed with depending shoes 208 (see Fig. 31) arranged to engage the enfolded strip of wrapping material at the longitudinal seam thereof to heat the same and soften the heat sealable material. A presser foot 209 is vertically swingably supported by an arm 211 on the crosspiece 121 and arranged to engage the enfolded strip of wrapping material to press the overlapping edges of the enfolded strip into intimate contact and effect a seal therebetween. A stream of cooling air is directed at the seam through a flexible tube 212 attached to the free end of the arm 211 and communicating with an air supply manifold 213 also mounted on the crosspiece 121. Air is supplied to the manifold 213 through a flexible conduit 214 connected to a suitable source of air under pressure.

In the specific apparatus illustrated, a pair of thermostatically controlled heating units are disposed respectively above and below the enfolded strip of wrapping material to heat the same at the point where the transverse seam is formed by the cutting and sealing mechanism 58. The upper heating unit 216 is mounted on the arm 207 and spaced longitudinally from the jaws on the carriage 58, when the latter is in its retracted position, a distance corresponding to the length of the packages.

formed by the machine or some multiple of that length. The lower heating element 217 is mounted on an up-standing arm 218 (see Fig. 9) carried by the crosspiece 143 and is spaced from the clamping jaws of the cutting and sealing mechanism a distance equal to the length of one package. When the carriage is in its retracted position, the lower heating element 217 underlies the upper heating element, as shown in Figure 8, the lower heating element being advanced with the cutting and sealing mechanism as the carriage is extended so as to continue heating the same region of the wrapper W. When the carriage is thereafter retracted and the jaws 59 and 61 closed, they press the previously heated transverse seams of the wrapper together, as shown in Figs. 10 and 12 and thereby seal the ends of the package.

The wrapping and sealing mechanism is designed for operation at relatively high speeds which require rapid reciprocation of the carriage. A stop 221 (Fig. 4) is provided to limit the extension of the carriage and a brake mechanism including a cable 222 and a flexible brake 223 (see Figs. 4 and 7) is provided for preventing rebound of the carriage from the stop. As best shown in Figure 7, the cable 222 is attached as by a fastener 224 to the carriage and the flexible band 223 is entrained over a shoe 225 attached to the frame. The other end of the flexible band 223 is attached to a spring 226 which is anchored by a bracket 227 on the base of the machine.

A tray 231 for collecting the packaged articles overlies the ends of the support wires 52 as best shown in Figures 3 and 8 and the forward edge of the tray is slotted as indicated at 232 to receive the support wires 52 and guide the wrapped articles onto the tray. The tray 231 is conveniently supported on the brackets 56 and extends therebetween crosswise of the wrapping and forming machine.

Wrapper feed mechanism

As is apparent from Figure 1, the several lanes of the wrapping and forming machine are spaced relatively close together and the spacing between the centers of successive lanes is appreciably less than the width of the strips of wrapping material W. In accordance with the present invention, an arrangement is provided for supporting the several rolls of wrapping material and for feeding the wrapping material from the rolls to the several lanes of the wrapping machine so that the strips, as they enter the machine, are spaced apart a distance less than the overall width of the wrapping strips. As best shown in Figure 23, the rolls R of wrapping material are supported on an upright frame structure including legs 241 and a horizontally disposed frame member 242 which extends between the upper ends of the legs. In the embodiment shown, the frame members 242 are arranged to extend parallel to the longitudinal axis of the forming and sealing machine and laterally offset from one side thereof. The roll support frame is rigidly secured to the frame of the wrapping and sealing machine by horizontally disposed members 243 which are secured to one end of the frame members 242 on the sealing and wrapping machine (see Figs. 4 and 23). A stationary shaft 246 is mounted in a bracket 247 (see Fig. 26) to extend longitudinally of the frame member 242 and in spaced relation therebelow and a driven shaft 248 is rotatably supported in the bracket 247 in spaced parallel relation with the shaft 246. A roller 249 having flanges 251 adjacent opposite ends thereof is rotatably supported on the stationary shaft 246 and a similar roller 253 having flanges 254 thereon, is rotatably supported on the driven shaft 248. The roll of wrapping material R is supported on the rollers 249 and 253, between the flanges thereon, and provision is made for driving the roller 253 to feed the strip of wrapping material therefrom. A sprocket 255 is provided at one end of the roller 253 and is drivingly connected by a chain 256 to a sprocket 257 on the roller 249.

In accordance with the present invention, the shaft 248 is continuously rotated during the operation of the machine and provision is made for selectively clutching and declutching the roller 253 to the shaft 248. As best shown in Figure 27, a collar 259 is secured to the shaft and engages one end of the roller 253. A second collar 261 is secured to the shaft 248 and is spaced axially from the other end of the roller 253. The roller 253 is normally free to rotate relative to the shaft 248 and the clutch mechanism is arranged to lock the rollers to the collars 259 and 261 to effect driving of the roller 253 with the drive shaft. For this purpose the roller 253 is provided with a counterbore 262 in one end thereof and an annular cam member 263 is non-rotatably disposed in the counterbore. The cam member 263 has a cam surface 264 on one end thereof which cooperates with the cam surface 265 formed on the end of a sleeve 266 which is rotatably supported in the counterbore 262. Anti-friction bearing elements 267 are provided between the cooperating cam surfaces. A ratchet wheel 268 is formed on the end of the sleeve 266 and extends radially outward between the end of the roller 253 and the adjacent collar 261. A spring 269 has one end thereof attached, by a fastener 271, to the ratchet wheel 268, the spring 269 extending part way around the periphery of the flange 254 on the roller, in the direction of rotation of the drive shaft 248, and has its other end secured to the flange on the roller by a fastener 272. In this manner, the spring 269 normally urges the ratchet wheel 268 and sleeve 266 in a direction to tend to cause the same to rotate relative to the roller 253 in the direction of rotation of the shaft 248. As the sleeve 266 is turned relative to the roller 253 and the annular cam member 263 carried thereby, the sleeve 266 is urged axially away from the roller. This forces one end of the roller 253 against the collar 259 and forces the ratchet wheel 268 against the collar 261 to thereby establish a friction drive from the shaft 248 through the collar 259 to the roller 253 to drive the same with the shaft. As is apparent, if the rotation of the roller 253 is retarded, due to the drag of the roll R, then the sleeve 266 will be turned in the direction of rotation of the shaft 248, relative to the roller 253 and thereby more firmly press the roller against the collar 259.

As shown in Figs. 26 and 27, the ratchet wheel 268 has teeth 268a on the periphery thereof and a dog 274 is mounted for movement into and out of engagement with the teeth 268a to thereby lock the ratchet wheel 268 and sleeve 266 against rotation. However, when the roller 253 is pressed into frictional contact with the collar 259, it will tend to continue to rotate with the shaft 248. Consequently, the cam member 263 will be rotated with the shaft relative to the sleeve 266, in a direction to effect disengagement of the clutch. This allows the roller to move away from the collar 259 thereby disconnecting the drive between the shaft 248 and the roller 253.

Provision is made for operating the dog 274 to maintain a substantially uniform tension on the strip of wrapping material W dispensed from the roll R. For this purpose a plurality of paper tensioning arms 276, one for each roll R, are pivotally supported on a rod 277 which extends longitudinally of the roll support frame and is supported at its ends in brackets 278. A paper tensioning roller 279 is rotatably supported on each of the arms 276 and is arranged to have the wrapping paper looped thereover as is clearly shown in Figs. 24, 25 and 26. The arms are held against axial movement on the rod 277 by a collar 281 and a spring 282 has one end thereof attached to the arm and the other end attached to a collar 283 which is fixed to the rod, to partially counterbalance the weight of the arms 276 and roller 279. The tension on the spring 282 is adjusted so that the weight of the arm and roller overcomes the spring bias whereby the arm and roller normally move downwardly and effect engagement of the dog 274 with the

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teeth on the sprocket wheel 268. As the strip of wrapping material W is drawn through the wrapping and sealing machine, the tension on the wrapping material causes the arms 276 to be raised thereby disengaging the dog 274 from the ratchet wheel 268. As previously described, the spring 269 effects engagement of the clutch to thereby drive the rollers 253 and 249 with the shaft until the arms 276 are again lowered to engage the dog 274 with the ratchet wheel.

The strip of wrapping material W extends upwardly from the roller 269 and passes over an intermediate roller 285 which extends longitudinally of the machine, as is clearly shown in Figure 23. The wrapping material then passes below a V-shaped forming shoe 286 supported on a bar 287 carried by the frame and between spaced fingers 288 carried by a support bar 289. In this manner, the flat strip of wrapping material is folded upon itself into an upright flat strip. Each of the flat strips of wrapping material are then drawn over a drive roller 291 aligned with the respective strip folding mechanism previously described, and over idler pulleys 293 to a second drive pulley 294 which is aligned with the end of a respective one of the wrapper support bars 48. A plow 295 is mounted on the back of each of the chutes 112 and arranged to spread apart the opposed sides of the folded strip whereby the strip is formed into an open upright channel as is drawn below the end of a respective one of the chutes 112.

The roll drive shaft 248 and each of the rollers 291 and 294 are continuously driven during the operation of the machine. For this purpose, a drive motor 297 (see Figs. 1, 28 and 29) is mounted on a bracket 298 at one end of the frame, a suitable guard plate 299 being interposed between the motor and the parts of the machine which engage the wrapping paper. The motor drives a sprocket 300 through a gear reduction 301, which sprocket is operatively connected by a chain 302 to a sprocket 303 on the shaft 248. The chain 302 is entrained intermediate its ends over an idler sprocket 304 and over a sprocket 305 mounted on an auxiliary shaft 306. The auxiliary shaft, as shown in Figure 29, is drivingly connected through bevel gears 307 and 308 to each of the drive rollers 291. A second auxiliary shaft 309 is connected by gearing 311 and 312 to the shaft 306 and is, in turn, drivingly connected by bevel gears 313 and 314 to the second set of drive rollers 294. The rollers 291 and 294 are driven in a direction to assist in advancing the folded strip of wrapping material to the wrapping and sealing machine and, when the advance of the wrapper is interrupted, these drive rollers slip on the wrapping strip.

Provision is made for operating the wrapping and sealing mechanism to advance the strips of wrapping material W, fold the latter into tubes around the articles to be wrapped, and to seal and cut off the end package, in timed relation with the feeding of articles to the wrapping machine. These articles are preferably fed simultaneously to each of the chutes 112. The drive apparatus includes a main drive motor 315 (Fig. 32) which is connected through a single revolution clutch 317, of conventional construction, to a drive cam 318. The clutch is arranged to be operated by a solenoid 319, the energization of which is controlled by a switch 321 (see Figs. 32 and 33). The clutch is such that when the switch 321 is closed momentarily, the solenoid 319 is operated which in turn operates the clutch 317 to drivingly connect the cam 318 to the motor 315 and thereby drive the cam through one complete revolution and stop. The cam 318 has an eccentric cam groove 322 therein and a slide 323 is mounted on a guide block 324 and has a follower 325 on one end thereof engageable in the cam groove to effect reciprocation of the slide in response to rotation of the cam. The other end of the slide 323 is adjustably connected to a rocker arm 326 attached to

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the shaft 157 to thereby oscillate the arm 156 in response to rotation of the cam.

The switch 321 is preferably operated in response to the feeding of articles A to the machine. This may be effected in various different ways. However, in the specific embodiment illustrated, the switch 321 is mounted on the frame extension 47 alongside the chutes 112. An operating arm 355 is pivotally mounted on this extension and overlies one or more of the wrapper support bars 48 at a point adjacent the article stop fingers 131 to be operated by an article on the support 48. A cam 356 is provided on the other end of the lever to operate the switch whenever an article comes to rest against the article stop.

A schematic wiring diagram is illustrated in Figure 32. As shown therein, the supply lines 335, 336 and 337 are connected through a main switch 338 and conductors 341, 342 and 343 to each of the main drive motor 315, the feed motor 297 and the vacuum pump motor 340, through suitable motor controls 344, 345, and 346, respectively. In addition, the heating elements 206, 216 and 217 are respectively connected through thermostats 347, 348 and 349 to the lines 342 and 343 so as to be energized when the main switch 338 is closed. As previously described, the solenoid 319 is connected by conductors 351 and 352 to the switch 321 and to the power supply conductors so as to energize the solenoid under the control of the switch 321.

Operation

In describing the subsequent operation, it is assumed that the individual strips of wrapping material W have been initially manually threaded past the forming shoes 286 and between the guide pins 288 and over the rollers 291, 293 and 294, over the support bars and wires 48 and 52 and between the opposed jaws 59 and 61 of the clamping and sealing mechanism. The apparatus is then started by closing the main switch 338 which supplies power to the main drive motor 315, the wrapping material feed motor 297 and the vacuum pump motor, to continuously drive the same during the operation of the machine. In addition, closing of switch 338 also supplies power to the heating elements 206, 216 and 217, provided for heat sealing the longitudinal and cross-seams of the wrapping material.

The one revolution clutch 317 is disengaged so that the cam member 318 is stopped in its initial position shown in Figure 30 in which it moves the operating lever 156 to its extreme clockwise position as viewed in Figs. 3, 6 and 8. When the lever 156 is in its initial or clockwise position, the carriage 58 is in its extended position shown in Figure 1, with the jaws 59 and 61 spaced apart. In addition, the guide plate 158 is also in its extended position and the cam plate 143 supported thereon is in its raised position. The follower 154 on the article stop rests in the well 152a on the cam plate, so that the article stop fingers 131 are lowered to engage the articles on the wrappers carried by the support bars 48.

The articles to be wrapped, for example frozen confection bars or frozen stick confections, are simultaneously delivered to each of the chutes 112 by an apparatus (not shown) and the articles are guided by the chutes onto the strips of wrapping material W on the support bars 48. The articles A engage the stops 131 so that each of the articles are accurately positioned at a pre-selected location on the strip of wrapping material. The position of the stop member 131 is correlated with the position of the clamping and sealing jaws, in both the extended and retracted positions of the carriage, so as to properly locate the article intermediate the ends of the package P which is formed by the machine. As is apparent, the stop mechanism 131 is supported for limited longitudinal adjustment by the bolt and slot arrangement 126 and 127.

The switch 321 is then operated by engagement with

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one of the articles A to thereby energize the solenoid 319 and operate the one revolution clutch 317. The clutch establishes a driving connection between the motor 315 and the cam 318 to thereby drive the lever 156 from the initial position shown in Fig. 30 in a counterclockwise direction to a displaced position and then back to the initial position. During the initial movement of the lever 156 in a counterclockwise direction, the lever operates through link 158 and arm 78 to open the clamping jaws 59 and 61 of the cutting and sealing mechanism, and to also move the cam plate 148 relative to the guide plate 135, in a direction to the left as shown in Figure 4, to thereby lower the cam plate prior to initiating retraction of the carriage. As the cam plate 148 is lowered, the transverse cam plate 175 is moved relative to the rods 165a and 165b, from the position shown in Fig. 18 to the position shown in Figure 17, to thereby release the article gripping fingers 168. Continued movement of the lever 156 in a counterclockwise direction after opening of the jaws 59 and 61 retracts the carriage, the cam plate 148 and the transverse cam plate 175, to the retracted positions thereof. Just prior to the carriage reaching its retracted position, the stops 199 on the rods 165a and 165b engage the slide block 189 and retract the same for a short distance. If the hole H in the strip of wrapping material overlies the openings 192 in the respective slide 189, during retraction thereof, the vacuum is broken so that the wrapper W is not retracted with the slide block. However, if the hole H does not overlie the openings 192 in the slide 189, as shown in Figure 21, then the vacuum will draw the wrapper W against the slide so as to retract the wrapper with the slide. In order to facilitate retraction of the wrapper, the slide block 142 is arranged to engage the follower 204 on the clamping mechanism 201 to release the same and permit the aforementioned retraction of the wrapper, when necessary to obtain synchronization of the advance of the wrapper with the openings therein.

As shown in Figure 10, the follower 104 which operates the tucker fingers 99 and 102, moves into the upper portion of the cam groove 103a, when the carriage reaches its retracted position, so as to raise the tucker fingers 99 and 102 into engagement with the outer faces of the enfolded wrapper. The tucker fingers prevent outward displacement of the opposed sides of the enfolded strip of wrapping material, when the clamping jaws are thereafter moved together to seal the ends of the packages and sever the end package from the strip. The lever 156 is thereafter moved in a clockwise direction back to its initial position. During the initial movement of the lever 156 in a clockwise direction, the lever, operating through the link 158, rotates the arm 78 in a clockwise direction to thereby close the clamping jaws 59 and 61, as shown in Figure 3. During this initial movement, the carriage 58 remains stationary in its retracted position. In addition, the lever 156, in the aforementioned initial movement, operates through link 163 and guide block 161 to move the cam plate 148 to the right relative to the guide plate 153. The followers 151 riding in the inclined cam slots 149 urge the cam plate upwardly, as shown in Figure 3, to thereby raise the article stop mechanism 125, prior to extension of the carriage 58.

In addition, when the guide plate 135 is in its retracted position and the cam plate 148 carried thereby in its lowered position, as shown in Figure 9, the transverse cam plate 175 is in its retracted position, shown in Figure 17, so that the gripper fingers 168 are spread apart, as shown in Figure 15. During the initial movement of the lever 156 in a clockwise direction in which the cam plate 148 is moved relative to the guide plate 135 in a direction to the right as viewed in Fig. 31, the transverse cam plate 175 is moved to the right relative to the bars 165a and 165b, to the position shown in Figure 18, to thereby swing the gripper fingers 168 inwardly to the

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position shown in Figure 15 to press the upstanding sides of the wrapper W into engagement with the article.

When the clamping jaws 59 and 61 close on the wrapper therebetween, further rotation of the arm 78 is interrupted so that continued movement of the lever 156 in a clockwise direction causes the carriage to be extended from the position shown in Figure 3 to the position shown in Figure 4. As the carriage is extended, the guide plate 135 and the cam plate carried therewith move in unison with the carriage, as do the bars 165a and 165b which carry the article gripping fingers 168. In addition, the transverse cam plate 165 is moved longitudinally with the carriage, with the cam plate in its extended position shown in Figure 18. Thus, the article stop mechanism 125 is maintained in its raised position, as the carriage is extended, and the article gripping fingers 168 are maintained in the clamping position shown in Figure 16, to thereby prevent displacement of the articles relative to the wrapper as the latter is advanced. As the carriage reaches its extended position, the follower 154 on the article stop mechanism rides downwardly on the cam portion 152a so as to lower the article stop, just prior to the carriage reaching its extended position, to stop a subsequent article and prevent feeding more than one article at a time. As the bars 165a and 165b move to their extended position, the stops 198 thereon engage the respective one of the slides 189, as shown in Figure 19, to move the slides to an extended position. Further, the follower 104 connected to the tucker blades 98 and 101 moves downwardly in the cam groove 103a, as the carriage is extended, to thereby lower the tucker fingers and maintain the latter lowered until the carriage is again retracted.

It is apparent that the jaws 59 and 61 are clamped together before extension of the carriage, so as to grip the enfolded wrapper therebetween and advance the wrapper along the support bar 48 and wires 52, as the carriage is extended. It is also to be noted that the wrapper is supported throughout its movement through the wrapping and forming machine on the bar 48 and wires 52, and that the lower jaw of the cutter mechanism is arranged to move above the wires and sever the wrapper thereabove.

The wrapper feed motor 297 operates continuously. However, the drive rolls 253 for each of the individual strips of wrapping material are normally disengaged from the drive shaft 248, whenever the dog 274 on the idler roll support arm 276, engages the ratchet wheel 268. As the strip of wrapping material W is drawn through the machine by the carriage, the tension on the wrapper is increased thereby raising the roll 279 and the roll support arms 276. This effects a driving engagement between the rolls 253 and the shaft 248 to unwind the wrapper W therefrom until the slack in the wrapper W is sufficient to again permit the arm 276 to drop downwardly and disengage the clutch. Since the several lanes of the wrapping and sealing machine are spaced relatively closer together than the width of the wrapper W, the latter is folded upon itself by passing the strip under the folding shoe 286 and between the guide pins 288 and the folded strip then passed over pulleys 291, 293 and 294 to the several lanes on the wrapping and sealing machine. The rollers 291 and 294 are continuously driven from the feed motor 297, to assist in advancing the wrapper to the wrapping and sealing machine.

We claim:

1. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for horizontal movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto said strip, means for folding the strip into a tube around the articles as the strip is advanced along said supporting means, a carriage mounted on said frame intermediate the ends of said wrapper strip support means for movement in a direction longitudinal-

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ly of said strip, a cutter mechanism on said carriage including relatively movable jaws for clamping the enfolded strip therebetween, and means for extending and retracting said carriage longitudinally of the frame and for operating said jaws in timed relation therewith to clamp the jaws on the strip before extending the carriage along the frame to thereby draw the strip along the support means and to open the jaws to thereby release the strip before retracting the carriage.

2. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material as it is moved therealong, means adjacent one end of said frame for feeding articles onto said strip, means for folding the strip on said support means into a tube as the strip is advanced along said support means, a cutter mechanism mounted on said frame to be extended in a direction away from said one end and to be retracted in a direction toward said one end, said cutter mechanism including an upper jaw and a lower jaw movable relative to each other, a rack attached to at least one jaw for movement therewith, a pinion meshing with said rack, an arm attached to said pinion, a link connected to the free end of said arm and extending in the direction of movement of said cutter mechanism on said frame, and means for moving said link alternately in opposite directions to move said jaws together and clamp the enfolded strip therebetween before extending the cutter mechanism along the frame to thereby draw the strip along the support means and to move the jaws apart to thereby release the strip before retracting the cutter mechanism.

3. In a wrapping machine including a frame, a carriage mounted for sliding movement longitudinally of said frame, upper and lower jaws mounted on said carriage for movement in a direction transverse to the direction of movement of the carriage, means on said frame for supporting a strip of wrapping material for movement longitudinally of said frame, said last-mentioned means including spaced wires extending longitudinally of said frame and overlying said lower jaw when said jaws are in their open position, said lower jaw having slots therein for receiving said wires, means for moving said jaws relative to each other to elevate the lower jaw above said wires and move the upper jaw down into engagement with the lower jaw and clamp the strip of wrapping material therebetween at a level above the lower jaw, and means for moving said carriage longitudinally of said frame to draw the strip of wrapping material along said support means.

4. The combination of claim 3 wherein said upper jaw has a cutter blade thereon, said lower jaw having a slot therein for receiving said cutter blade to sever an end portion from said strip.

5. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto said strip, means for folding the strip into a tube around the articles as the strip is advanced along the supporting means, a carriage mounted on said frame for movement in a direction longitudinally of said strip, upper and lower clamping jaws mounted on said carriage for movement into and out of engagement with the enfolded strip disposed therebetween, said upper jaw including a cutter blade and a pair of jaw members disposed on opposite sides of the blade and mounted for vertical sliding movement relative thereto, means yieldably urging the jaw members downwardly relative to said blade to a level below the lower edge of said blade, said lower jaw having a slot therein for receiving said blade, means for moving said carriage along the frame to extend the carriage away from said one end thereof and to retract said carriage toward said one end of the frame, and means for moving said jaws toward and away from each other to clamp the enfolded strip therebetween and

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sever an end package from the enfolded strip when said carriage is extended and to open said jaws when the carriage is retracted.

6. The combination of claim 5 wherein said support means includes spaced wires, said carriage being located intermediate the ends of said wires, said lower jaw having spaced transverse slots therein for receiving said wires when said jaws are closed.

7. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for horizontal movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto said strip, means for folding the strip into a tube around the articles as the strip is advanced along said supporting means, a carriage mounted on said frame intermediate the ends of said wrapper strip support means for movement in a direction longitudinally of said strip, a cutter mechanism on said carriage including relatively movable jaws for clamping the enfolded strip therebetween, means for extending and retracting said carriage longitudinally of the frame and for operating said jaws in timed relation therewith to clamp the jaws on the strip before extending the carriage along the frame to thereby draw the strip along the support means and to open the jaws to thereby release the strip before retracting the carriage, an article stop disposed above said supporting means and mounted for vertical movement into and out of the path of the articles on the strip, and means operated in timed relation with the movement of said cutter mechanism longitudinally of said strip for raising said stop when said cutter mechanism is extended to advance the strip and for lowering said stop when the cutter mechanism is retracted.

8. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material as it is moved therealong, means adjacent one end of said frame for feeding articles onto said strip, means for folding the strip on said support means into a tube as the strip is advanced along said support means, a cutter mechanism mounted on said frame to be extended in a direction away from said one end and to be retracted in a direction toward said one end, said cutter mechanism including an upper jaw and a lower jaw movable relative to each other, a rack attached to at least one jaw for movement therewith, a pinion meshing with said rack, an arm attached to said pinion, a link connected to the free end of said arm and extending in the direction of movement of said cutter mechanism on said frame, means for moving said link alternately in opposite directions to move said jaws together and clamp the enfolded strip therebetween before extending the cutter mechanism along the frame to thereby draw the strip along the support means and to move the jaws apart to thereby release the strip before retracting the cutter mechanism, an article stop disposed above said supporting means and mounted for vertical movement into and out of the path of the articles on the strip, a guide plate slidably mounted on said frame and operatively connected to said cutter mechanism for movement therewith, a cam plate mounted on said guide plate for limited movement relative thereto between a raised and a lowered position, follower means connected to said stop means for raising and lowering the latter in response to raising and lowering of said cam plate, and means operatively connected to said link moving means for moving said cam plate relative to the guide plate to raise the cam plate while said cutter jaws are moved together and to lower the cam plate while the cutter jaws are moved apart.

9. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto the strip of wrapping material, means for folding the strip into a tube around the articles as the strip is advanced along said supporting means, a carriage

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mounted on said frame to be extended in a direction away from said one end and to be retracted toward said one end, jaws mounted on said carriage for movement in a direction transverse to the direction of movement of said carriage to clamp the enfolded strip therebetween, fingers disposed on opposite sides of said support means between said carriage and said article feed means and mounted for movement longitudinally of the frame with said carriage and laterally of said support means into and out of engagement with said strip to grip the article in the strip therebetween, means for extending and retracting said carriage and for operating said jaws in timed relation to clamp the jaws when the carriage is extended and to open the jaws when the carriage is retracted, and means operative during extension of the carriage for moving said fingers together to grip the wrapper strip and the article disposed therein and for moving the fingers away from the strip during retraction of the carriage.

10. The combination of claim 9 wherein said fingers are yieldably mounted on said rods for movement relative thereto in a direction transverse to said strip to thereby resiliently grip said strip when the fingers are moved into engagement therewith.

11. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto the strip of wrapping material, means for folding the strip into a tube around the articles as the strip is advanced along said supporting means, a carriage mounted on said frame to be extended in a direction away from said one end and to be retracted toward said one end, jaws mounted on said carriage for movement in a direction transverse to the direction of movement of said carriage to clamp the enfolded strip therebetween, a pair of rods extending longitudinally of said frame, means mounting said rods for movement longitudinally of said frame with said carriage and for limited oscillation about the longitudinal axis thereof, gripper fingers on each of said rods between said carriage and said article feed means and extending upwardly therefrom for gripping the enfolded strip of wrapping material therebetween, means for reciprocating said carriage and for operating said jaws in timed relation to close the jaws when the carriage is extended and to open the jaws when the carriage is retracted, and means for oscillating said rods in timed relation to the reciprocation of said carriage to move said fingers into gripping engagement with the enfolded strip when the carriage is extended and to move the fingers away from the strip when the carriage is retracted.

12. The combination of claim 11 wherein said means for oscillating said rods includes a cam plate movable relative to said rods and a follower on said rods engageable with said cam plate.

13. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto the strip of wrapping material, means for folding the strip into a tube around the articles as the strip is advanced along the supporting means, a carriage mounted on said frame to be extended in a direction away from said one end and to be retracted toward said one end, jaws mounted on said carriage above and below the strip for movement into and out of engagement with said strip, operating means movable longitudinally of the frame and connected to said jaws and operative in response to the initial movement of the operating means in one direction to close the jaws and thereafter extend the carriage along the frame and operative in the initial movement thereof in the other direction to open the jaws and thereafter retract the carriage along the frame, a pair of rods extending longitudinally of the frame, means mounting said rods for movement longitudinally of said

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frame with said carriage and also for limited oscillation about the longitudinal axis thereof, gripper fingers on each of said rods located between said carriage and said article feed means for gripping the enfolded strip of wrapping material therebetween, a cam plate mounted for movement relative to said rods, followers on said rods engageable with said cam plate for oscillating said rods in response to movement of said cam plate relative thereto, and means connected to said operating means for moving said cam plate relative to said rods during the initial movement of said operating means in either direction of movement of the latter to oscillate the rods and move the fingers into gripping position before the carriage is extended and to oscillate the rods and move the fingers out of gripping position before the carriage is retracted.

14. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement longitudinally of said frame, means adjacent one end of said supporting means for feeding articles onto the strip of wrapping material, means for folding the strip into a tube around the articles as the strip is advanced along the supporting means, a carriage mounted on said frame to be extended in a direction away from said one end and to be retracted toward said one end, jaws mounted on said carriage above and below the strip for movement into and out of engagement with said strip, operating means movable longitudinally of the frame and connected to said jaws and operative in response to the initial movement of the operating means in one direction to close the jaws and thereafter extend the carriage along the frame and operative in the initial movement thereof in the other direction to open the jaws and thereafter retract the carriage along the frame, a pair of rods extending longitudinally of the frame, means mounting said rods for movement longitudinally of said frame with said carriage and also for limited oscillation about the longitudinal axis thereof, gripper fingers on each of said rods located between said carriage and said article feed means for gripping the enfolded strip of wrapping material therebetween, a first cam plate mounted for movement relative to said rods, a first follower means engageable with said first cam plate for oscillating said rods in response to movement of said first cam plate relative thereto, an article stop disposed above said supporting means and mounted for vertical movement into and out of the path of the articles on said strip, a guide plate slidably mounted on said frame and operatively connected to said carriage for movement therewith, a second cam plate mounted on said guide plate for limited movement relative thereto between a raised position and a lowered position, a second follower means connected to said stop means for raising and lowering the latter in response to raising and lowering of said second cam plate, means connecting said second cam plate to said operating means for moving the second cam plate relative to the guide plate to raise the second cam plate during the initial movement of said operating means in said one direction and to lower the second cam plate during the initial movement of said operating means in the other direction, and a link connecting the second cam plate to said first cam plate for moving the latter relative to said rods in response to raising and lowering of said second cam plate.

15. The combination of claim 14 wherein said strip has longitudinally spaced apertures therein, a member having an opening therein mounted on said support means for limited movement longitudinally thereof, means connecting said opening in said plate to a source of low pressure, and lost-motion means on said rods engageable with said member for reciprocating the latter in response to axial reciprocation of said rods to thereby retract the strip whenever the apertures in the strip do not register with the opening in said member.

16. A multiple lane machine for wrapping articles in strips of wrapping material comprising means for supporting the strips of wrapping material for horizontal move-

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ment, means for supporting a plurality of rolls of wrapping material for rotation about a horizontal axis, means for folding the opposed sides of the strips of wrapping material upwardly into face to face contact to form upright folded strips, means for guiding the upright folded strips onto the strip support means with the centers of the upright strips laterally spaced apart a distance less than the width of an unfolded strip, means for spreading opposed sides of the strips apart to form the strips into open top channels, means for feeding articles to be wrapped into the open top channels, means for folding the sides of the channels inwardly to entube the articles, and means operable to grip the enfolded strips and to draw the latter along said support means past said spreading means, said article feed means and said strip enfolding means.

17. A multiple lane machine for wrapping articles in strips of wrapping material comprising means for supporting the strips of wrapping material for horizontal movement, means for supporting a plurality of rolls of wrapping material in endwise aligned relation for rotation about a horizontal axis whereby the strips as they unwind from the rolls have the centers thereof spaced apart a distance greater than the width of the strips, means for folding the opposed sides of each strip upwardly into face-to-face contact to form upright folded strips, means for guiding the upright folded strips onto the strip support means with the centers of the strips laterally spaced apart a distance less than the width of an enfolded strip, means for spreading opposed sides of the strips apart to form the strips into upwardly opening channels, means for feeding articles to be wrapped into the open top channels, means for folding the sides of the articles inwardly to entube the articles, and means operable to grip the enfolded strips and to draw the latter along said support means past the spreading means, said article feed means and the strip enfolding means.

18. The combination of claim 17 wherein rolls are supported for rotation about an axis extending longitudinally of the direction of movement of the strips on the strip support means.

19. A multiple lane machine for wrapping articles in strips of wrapping material comprising means for supporting the strips for horizontal movement in side-by-side relation, a pair of spaced parallel shafts, a plurality of pairs of rollers mounted on said shafts for supporting rolls of wrapping material thereon in endwise aligned relation by engagement with the periphery of the rolls, means engageable with each of the strips unwound from the rolls for folding opposed sides of the strips upwardly into face-to-face contact to form an upright folded strip, means for guiding the upright strips onto the strip support means with the centers of the strips laterally spaced apart a distance less than the width of the unfolded strips, means for spreading opposed sides of the strips apart to form the strips into open top channels, means for feeding articles into the open top channels, means for folding the sides of the channels inwardly to entube the articles, means operable to grip the enfolded strips and to draw the latter along said support means, a plurality of strip tensioning arms each engageable with one of the strips as they are unwound from the rolls, means for driving one of said shafts, and means operated by said tensioning arms for drivingly connecting and disconnecting a respective one of said support rollers to said one shaft to drive the roll thereon and unwind the strip of wrapping material therefrom.

20. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement horizontally therealong, means adjacent one end of said supporting means for feeding articles onto said strip, means for folding the strip into a tube around the articles as the strip is advanced along said supporting means, a carriage mounted on said frame for movement longitudinally of said strip, means for extending said carriage in a direction away from said one end thereof and

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for retracting said carriage toward said one end thereof, upper and lower clamping jaws mounted on said carriage for movement into and out of engagement with the enfolded wrapper strip therebetween, means for opening and closing said jaws in timed relation with the movement of said carriage to close the jaws during extension of the carriage and thereby advance the strip of wrapping material and to open the jaws when the carriage is retracted and thereby release the strip, tucker fingers mounted on said carriage for movement into and out of an operative position adjacent opposite sides of the enfolded wrapper strip, and means for operating the tucker fingers in timed relation with the movement of said carriage to move the tucker fingers into operative position alongside the enfolded wrapper strip before closing of said jaws to prevent outward displacement of the opposed sides of the enfolded wrapper strip when said clamping jaws are closed.

21. The combination of claim 20 wherein said means for operating said tucker fingers includes a cam on said frame and a follower on said tucker fingers engageable with said cam to move the tucker fingers into operative position when the carriage is retracted.

22. A wrapping machine including a frame, means on said frame for supporting a strip of wrapping material for movement horizontally therealong, means adjacent one end of said supporting means for feeding articles onto said strip, means for folding the strip into a tube around the articles as the strip is advanced along said supporting means, a carriage mounted on said frame for movement longitudinally of said strip, means for extending said carriage in a direction away from said one end thereof and for retracting said carriage toward said one end thereof, upper and lower clamping jaws mounted on said carriage for movement into and out of engagement with the enfolded wrapper strip therebetween, means for opening and closing said jaws in timed relation with the movement of said carriage to close the jaws during extension of the carriage and thereby advance the strip of wrapping material and to open the jaws when the carriage is retracted and thereby release the strip, a first pair of tucker fingers mounted on the carriage at one side of the lower jaw member for movement into and out of operative position adjacent opposite side edges of the enfolded strip of wrapping material, a second pair of tucker fingers mounted at the other side of the lower jaw member for movement with the first pair, and means including a cam on said frame and a follower connected to said tucker fingers for raising said fingers above the lower jaw when said carriage is moved to its retracted position.

23. A machine for wrapping articles in a strip of wrapping material having longitudinally spaced indicia spaced apart a distance corresponding to the length of the packages to be formed by the machine comprising, a frame, means on the frame for feeding articles onto the strip of wrapping material, a carriage mounted for reciprocation on said frame and arranged to be extended away in a direction away from said feed means a distance greater than the spacing between indicia on the strip and to be retracted toward said feed means, jaws mounted on said carriage for movement into and out of engagement with the strip therebetween, means for operating the carriage and jaws in timed relation to close the jaws as the carriage is extended and to open the jaws when the carriage is retracted, and means for detecting the indicia on said strip and for retracting the strip a preselected distance during retraction of the carriage whenever said indicia does not register with said detecting means.

24. A machine for wrapping articles in a strip of wrapping material having longitudinally spaced apertures therein spaced apart a distance corresponding to the length of the packages to be formed by the machine comprising, a frame, means on the frame for supporting a strip of wrapping material for movement horizontally thereacross, means adjacent one end of said support means for feed-

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ing articles to be wrapped onto the strip, means for fold-
ing the strip into a tube around the article, a carriage
mounted on the frame for movement longitudinally of the
strip and arranged to be extended in a direction away
from said one end of the support means a distance greater
than the spacing between the openings in the wrapper
strip and to be retracted back toward said one end, jaws
mounted on said carriage for movement into and out of
engagement with the enfolded strip of wrapping material
therebetween, means for operating said carriage and said
jaws in timed relation to close said jaws when the car-
riage is extended and thereby advance the strip a distance
greater than the spacing between the holes in the wrapper
strip and to open the jaws when the carriage is retracted,
a slide mounted on said strip support to underlie the strip
of wrapping material thereon, said slide having a port
therein adapted to register with the opening in the wrap-
per strip, means communicating said port with a source
of low pressure, and means for reciprocating said slide in
timed relation with the movement of the carriage to re-
tract the strip a short distance when the hole in the strip
does not register with the port in the slide.

25. A machine for wrapping articles in a strip of
wrapping material having longitudinally spaced apertures
therein spaced apart a distance corresponding to the
length of the packages to be formed by the machine com-
prising, a frame, means on the frame for supporting a
strip of wrapping material for movement horizontally
thereacross, means adjacent one end of said support
means for feeding articles to be wrapped onto the strip,
means for folding the strip into a tube around the article,
a carriage mounted on the frame for movement longi-
tudinally of the strip and arranged to be extended in a
direction away from said one end of the support means
a distance greater than the spacing between the openings
in the wrapper strip and to be retracted back toward said
one end, jaws mounted on said carriage for movement
into and out of engagement with the enfolded strip of
wrapping material therebetween, means for operating said
carriage and said jaws in timed relation to close said
jaws when the carriage is extended and thereby advance
the strip a distance greater than the spacing between the
holes in the wrapper strip and to open the jaws when
the carriage is retracted, a slide mounted on said strip
support to underlie the strip of wrapping material there-
on, means for reciprocating said slide in timed relation
with the operation of said carriage to extend the slide as
the carriage is extended and to retract the slide through
a distance greater than the amount of overtravel of the

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strip during each advancement thereof, said slide having
port means therein opening at the upper face of the slide,
and means communicating said port means with a source
of low pressure to draw the wrapper thereagainst, when
one of said openings does not overlie said port means,
and thereby retract said wrapper when said slide is re-
tracted.

26. The combination of claim 25 wherein the overall
length of said port means in the direction of movement
of said slide is at least equal to the distance through
which said slide is reciprocated.

27. The combination of claim 26 including means for
gripping said strip to retard retraction of said strip, and
means for releasing said gripper means when said slide
is retracted, to permit retraction of the strip.

28. The combination of claim 26 including vacuum
operated means adjacent said slide for holding said strip
down on said slide.

29. A machine for wrapping articles in a strip of heat
sealable wrapping material comprising a frame, means
on the frame for folding the strip into a tube, a carriage
mounted on the frame for reciprocation longitudinally of
the strip between a retracted and an extended position,
jaws on the carriage engageable with the enfolded strip
to clamp the enfolded strip therebetween, means for re-
ciprocating said carriage and for operating said jaws in
timed relation to open the jaws when the carriage is re-
tracted and to close the jaws onto the enfolded strip when
the carriage is extended, and means disposed in advance
of said carriage when the latter is in its retracted posi-
tion a distance substantially equal to the distance through
which the carriage is moved for heating said wrapper
strip whereby said jaws are operative to press the heated
wrapper together and to cool and seal the same when
said jaws are closed.

30. The combination of claim 29 wherein said heat-
ing means includes a heater mounted on said carriage for
movement therewith and spaced from said jaws a distance
substantially equal to the distance through which said
carriage is moved.

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