Jan. 13, 1953 F. C. CRESCENZO 2,624,994

WRAPPING MACHINE FOR FLEXIBLE ARTICLES

Filed Jan. 11, 1951 5 Sheets-Sheet 1

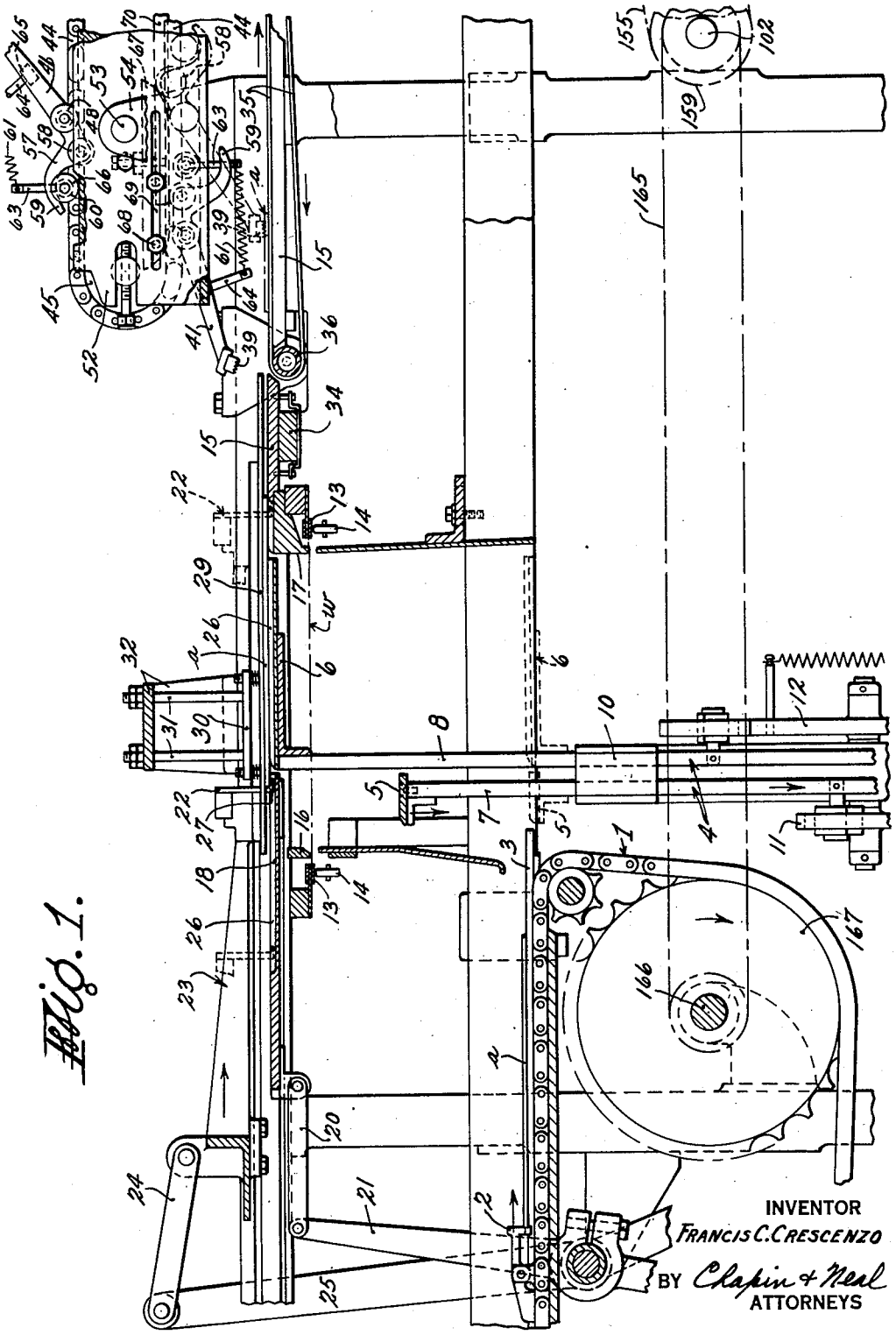


Fig. 1.

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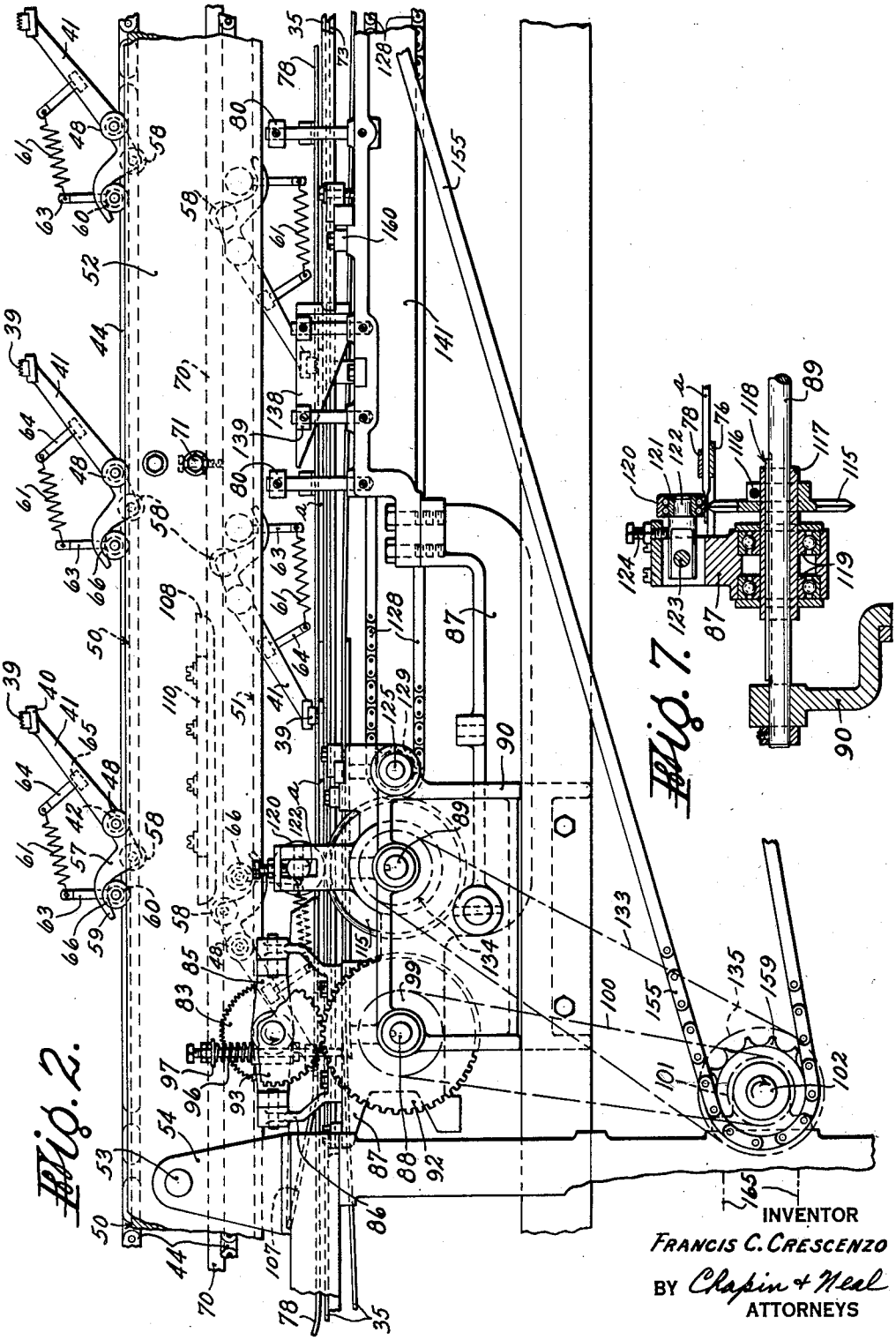


Fig. 2.

Fig. 7.

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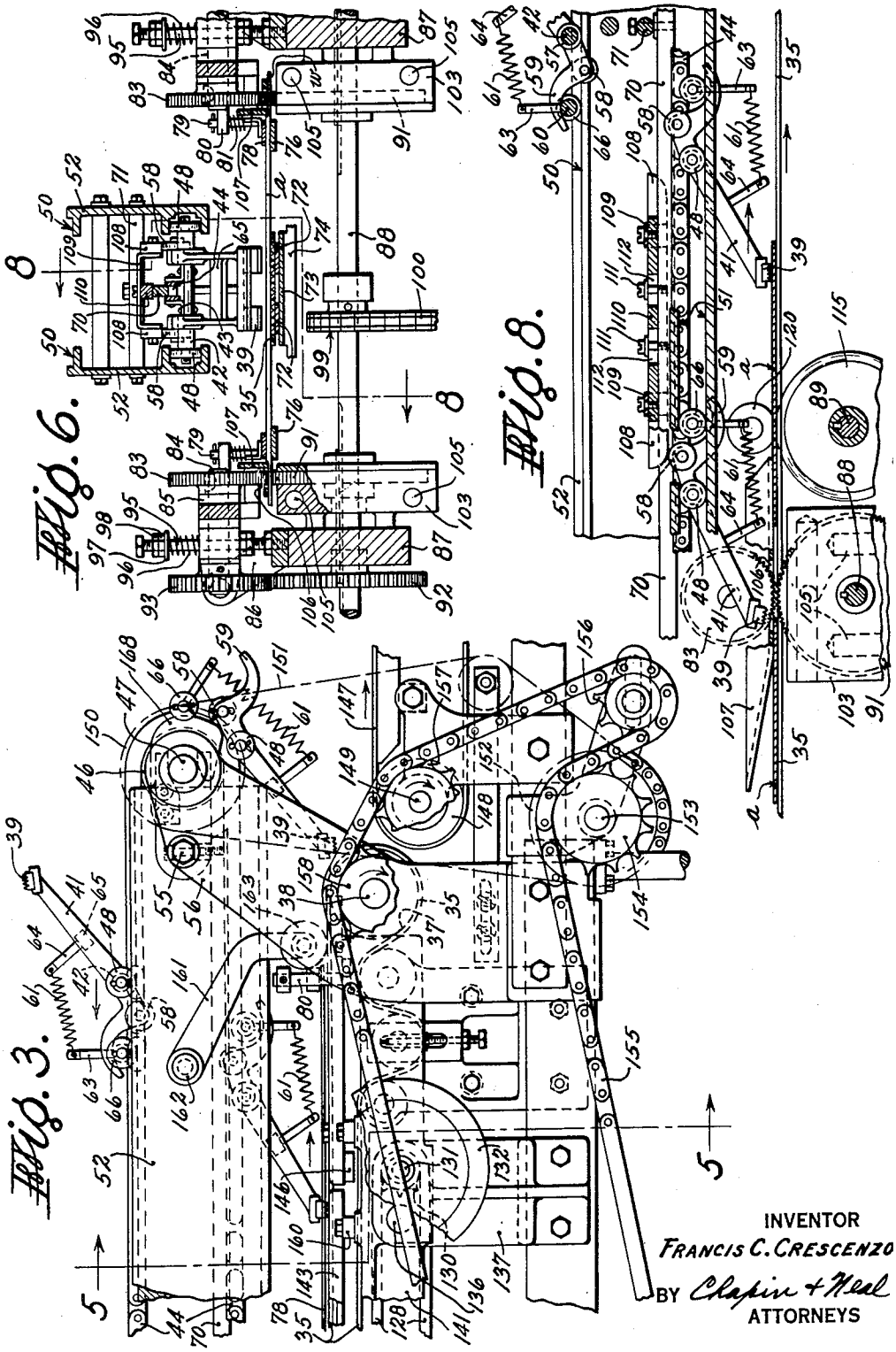


Fig. 6.

Fig. 8.

Fig. 3.

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WRAPPING MACHINE FOR FLEXIBLE ARTICLES

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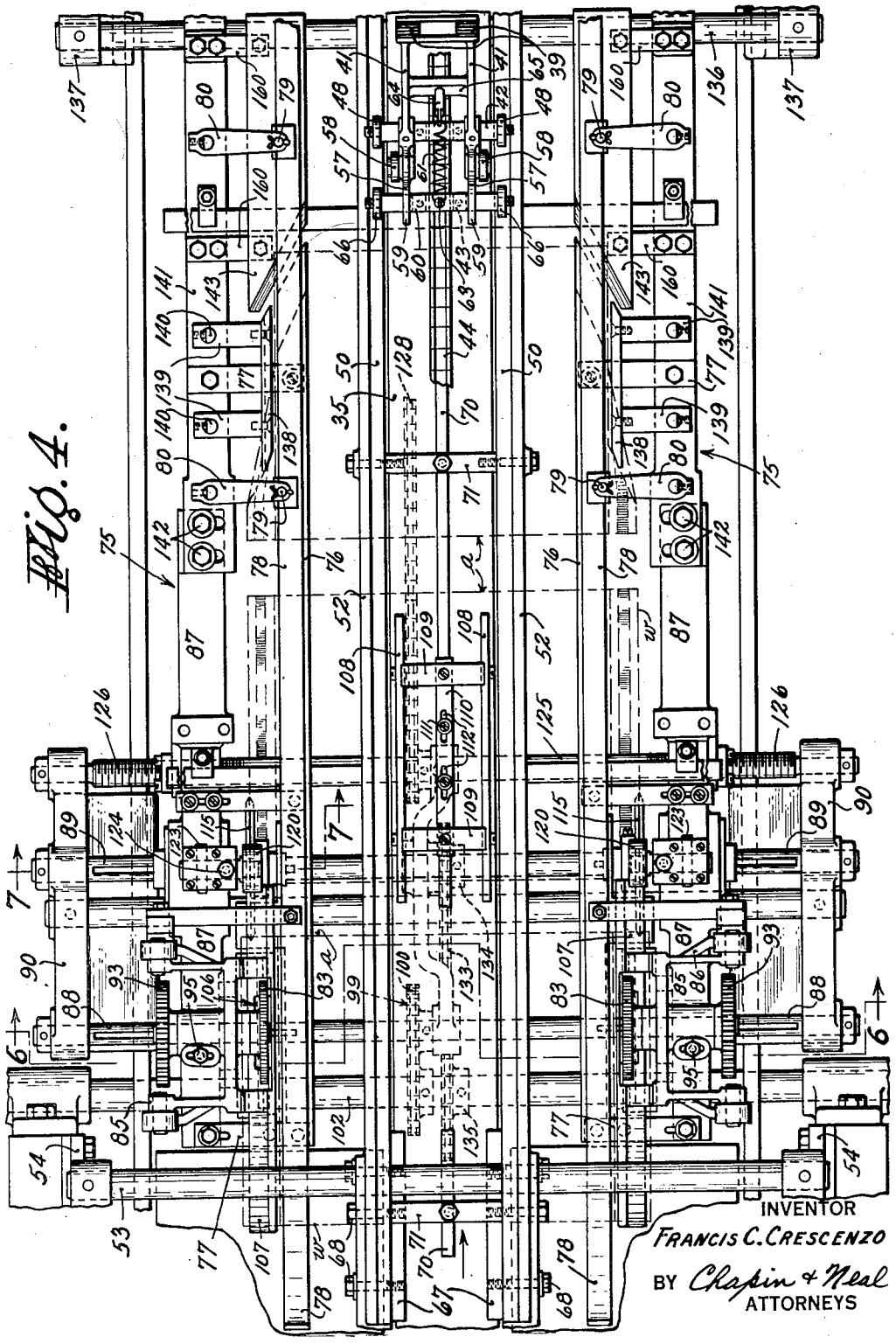


Fig. 4.

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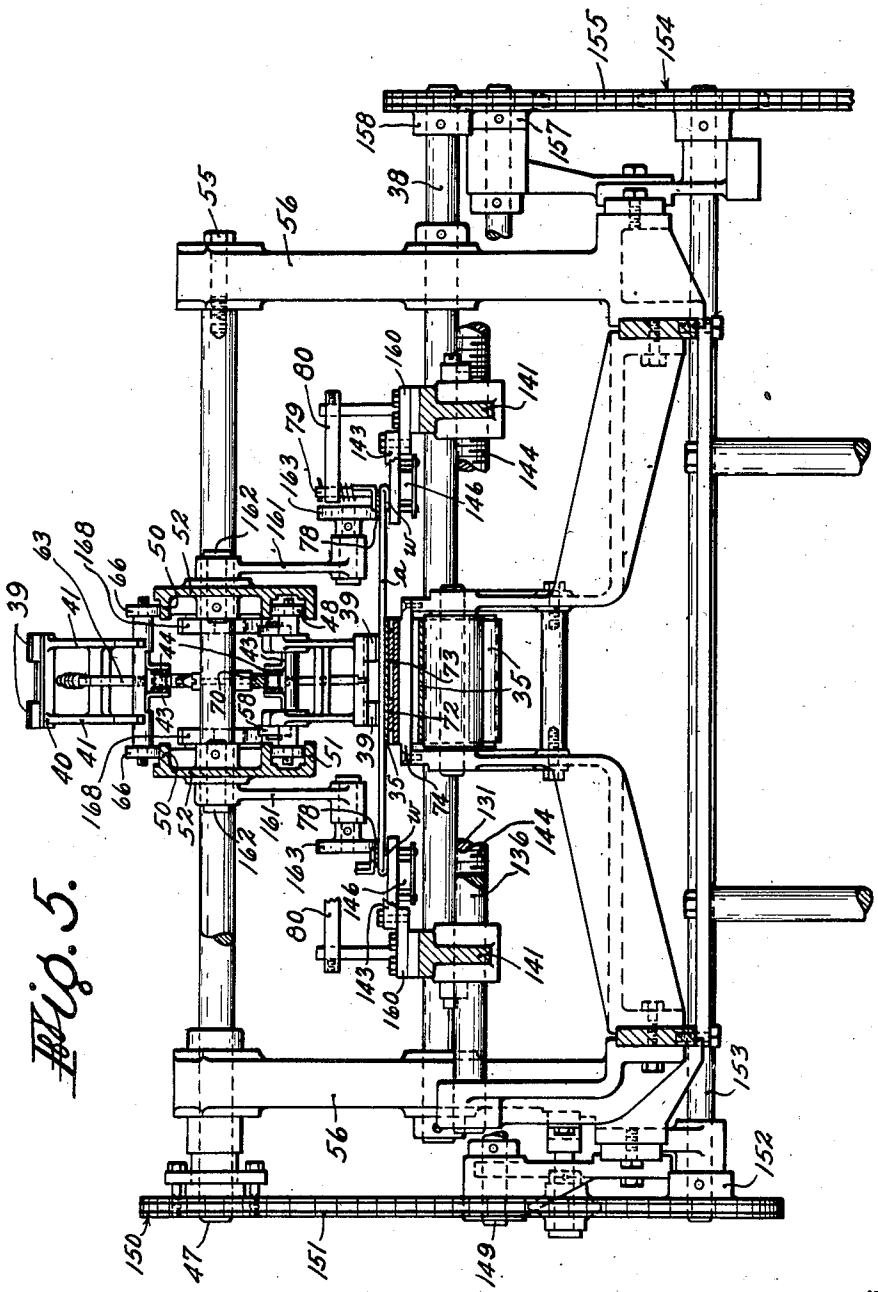


Fig. 5.

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UNITED STATES PATENT OFFICE

2,624,994

WRAPPING MACHINE FOR FLEXIBLE ARTICLES

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Application January 11, 1951, Serial No. 205,590

8 Claims. (Cl. 53—131)

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This invention relates to an improvement in machines for wrapping relatively thin flexible articles such as decorated shelf paper, folded paper table cloths, table mats, and similar articles.

The principal and general object of the invention is the provision of a machine for the purpose which will enclose objects of the above character in a wrapper and seal the wrapper in a rapid and efficient manner without damage to the article in its passage through the wrapping and sealing instrumentalities.

A more specific object is the provision in a machine of this character of improved wrapping and sealing instrumentalities capable of operating on relatively thin flexible articles at high speed to produce a uniform package without wrinkling or otherwise damaging the article or wrapper.

A further specific object is the provision of means for advancing the articles in the course of the wrapping and sealing operations, which will cooperate with the wrapping and sealing instrumentalities to maintain the article flat and in register with the wrapper during the operation of the machine.

Other and further objects relating to details of construction will be made apparent in the following specification and claims.

In the accompanying drawings which illustrate one embodiment of the invention,

Fig. 1 is a side elevational view of the infeed end of the machine, partly in section;

Fig. 2 is a similar view of the central portion of the machine;

Fig. 3 is a similar view of the discharge end of the machine;

Fig. 4 is a plan view of the structure shown in Fig. 2;

Fig. 5 is a sectional view substantially on line 5—5 of Fig. 3;

Fig. 6 is a sectional view substantially on line 6—6 of Fig. 4;

Fig. 7 is a sectional detail view of the trimming mechanism substantially on line 7—7 of Fig. 4; and

Fig. 8 is a sectional detail view substantially on line 8—8 of Fig. 6, showing the action of the package feed control cam.

As shown in Fig. 1, flat thin articles *a* are fed into the machine in any suitable manner as by a constantly driven conveyor 1 carrying a plurality of pushers 2 which advance the article over guide rails 3 and onto an elevator, generally indicated at 4, when the latter is in its lower position, shown

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in dotted lines. The elevator is formed in rear and forward sections 5 and 6 supported on the upper ends of respective vertical slides 7 and 8, moving in bearings 10. Elevators of this type are well known and a detailed description thereof is believed unnecessary, other than to say that the slides 7 and 8 are reciprocated by respective levers 11 and 12, so timed that the two sections are aligned in the lower position and moved together to their upper position but, as shown in Fig. 1, the rear section 5 retreats in advance of section 6 to permit the rear wrapper fold to be made as later referred to.

As the articles are raised by the elevator they encounter a wrapper *w* which is fed into the path of the article in any suitable manner as by belts 13 and friction wheels 14.

The article and wrapper are elevated to the level of the table 15, the rear and forward extensions of the wrapper being bent downwardly by engagement with stationary folders 16 and 17. The rear elevator section 5 is then lowered as shown in full line in Fig. 1 and a rear folder blade 18 is advanced to fold the downwardly extending rear wrapper extension beneath the article. The folder blade is connected by a link 20 to one end of a lever 21 which is actuated by a cam, not shown, to reciprocate the folder blade. Upon completion of the rear fold by blade 18 a pusher 22 is advanced to move the article and wrapper from the elevator onto the table, the downwardly extending forward extension of the wrapper being folded beneath the article and into overlapping relation with the rear fold as the article passes over the edge of the table. The pusher 22 is carried at the forward end of a slide 23 which is connected by a link 24 to a lever 25 which is actuated by a cam, not shown, to reciprocate the pusher 22 in timed relation with the blade 18 and the elevator.

The blade 18, elevator section 6, and the adjacent portion of table 15 are grooved as at 26 to receive fingers 27 extending downwardly from the pusher 22. As the package is advanced by the pusher 22, it is held in place by overlying spring mounted plates 29 carried by bars 30 and spaced to permit passage of fingers 27. Bars 30 are suspended by rods 31 from a bridge member 32 supported at the sides of the table.

The pusher 22 advances to the dotted line position shown in Fig. 1, leaving the package with its rear portion resting on a portion of the table which carries a heater 34 which acts to heat seal the overlapping portions of the rear and forward under-folds of the wrapper. As shown in Fig. 1,

the forward portion of the package freely overlies a constantly traveling belt 35 which passes around a rear idle pulley 36 and a forward pulley 37 (Fig. 3) secured to a shaft 38 which is constantly driven, as later described. The package is pressed against the heated table surface by the spring plates 29 with sufficient firmness so that the belt 35 does not advance the package. After an interval sufficient to effect the sealing of the underfolds, the upper surface of the forward edge portion of the package is engaged, as shown in dotted lines in Fig. 1, by one pair of a series of pairs of continuously traveling pulling fingers 39, which press the package against the belt 35 and, with the belt, draw the package forwardly.

As best shown in Figs. 2, 3, 5 and 6, the fingers 39, which are preferably formed of rubber or other yielding anti-friction material, are fixed in transverse bars 40 which are connected by arms 41 to pivot shafts 42. The shafts 42 are connected at 43 to a normally constantly traveling chain 44 trained around a rear sprocket 45 (Fig. 1) and a forward sprocket 46, Fig. 3, the latter sprocket being fixed to a shaft 47 which is driven as later described. The ends of the pivot shafts 42 are provided with wheels 48 which ride on upper tracks 50 through the upper run of the chain and in lower tracks 51 through the lower run of the chain. Tracks 50 and 51 are formed in side plates 52 which are supported at their rear ends by cross rods 53 mounted in standards 54, and at their forward ends by cross rods 55 and shaft 47, mounted in frame brackets 56.

As shown in Fig. 1 and at the right in Fig. 4, the arms are provided with extensions 57 which carry cam rolls 58. The extensions terminate in stop members 59 which are normally held in engagement with cross rods 60, fixed to the chain 44, by springs 61 connected between pins 63 and 64 carried respectively by rods 60 and cross member 65 extending between the arms 41. Rods 60 carry guide wheels 66 which travel on tracks 50—51 advance of wheels 48. As the arms round the rear sprocket 45 (Fig. 1), the cam rolls 58 engage cams 67 which are adjustably supported by bolts 68 extending through slots 69 in side plates 52. The cams 67 swing arms 41 upwardly as shown in full lines in Fig. 1 and maintain them in raised position until the arms reach the dotted line position in the latter figure, when rolls 58 run off of the cams permitting the fingers 39 to engage the forward edge portions of the package under the action of spring 61 to press the package against the belt 35 and pull the article forwardly as previously described.

Any tendency of the chain 44 to buckle under the pull of springs 61 is resisted by a center rail 70, which is bolted to the rods 71 (Figs. 4 and 8), and beneath which the chain 44 rides. The belt 35 runs over spaced longitudinally directed bars 72, Fig. 6, which rest on a plate 73 supported on suitable cross members 74 extending between side frame members generally indicated at 75.

As best shown in Figs. 4 and 6, the sides of the article extend outwardly at each side of the belt 35. The side edge portions of the package ride on stationary bars 76 which are supported by brackets 77 from the frame members 75. Upper bars 78 are carried by pins 79 which extend through brackets 80, carried by the frame members 75, springs 81 pressing the bars lightly against the article.

As the partially wrapped article is drawn forwardly, the portions of the wrapper extending outwardly from the sides of the article are engaged between pairs of crimping rolls, Figs. 2, 4 and 6, positioned at opposite sides of the path of the article. The upper crimping roll 83 of each pair is mounted on the inner end of a short shaft 84 journaled in a yoke 85 pivotally mounted in brackets 86 carried by frame members or carriages 87. The carriages 87 are slidably mounted on shafts 88 and 89 journaled in brackets 90 (Fig. 4) carried by the machine frame. The lower crimping rolls 91 are splined on shaft 88 to which are also splined gears 92 which mesh with gears 93 fixed on the outer ends of the short shafts 84 which carry the upper crimping rolls. The members 87 are provided with vertical pins 95 which extend through the yokes 85. Springs 96 surround the pins 95 and are compressed between the yokes and washers 97, held on the pins by nuts 98, to yieldingly press the upper crimping rolls against the lower crimping rolls. Shaft 88 carries a sprocket 99 driven by a chain 100 from a sprocket 101 secured to a constantly rotating, power driven shaft 102, later described.

The lower crimping rolls rotate in contact with blocks 103 carried by members 87 and heated by any suitable electrical heating units as indicated at 105. The lower heating rolls are thus maintained at a temperature to heat seal the wrapper extensions together as they are crimped. The upper crimping rolls operate through opening 106 (Figs. 6 and 8) formed in shoes 107 which press the upper and lower wrapper extensions together as they pass between the crimping rolls.

The crimping of the side extensions of the wrapper tends to shorten the extensions longitudinally with the result that the wrapper tends to shift slightly over the face of the article. To permit this adjustment to take place uniformly and without wrinkling, the pulling fingers are raised to permit the package to be advanced freely by the crimping rolls. As best shown in Figs. 4 and 8, as the wrapper extensions are engaged by the crimping rolls, the cam rolls 58 engage fixed cams 108 which raise the fingers clear of the package, thus releasing the package from the pull of the fingers and belt 35. The cams 108 are supported at the ends of crossbars 109 which are carried by a longitudinal bar 110 which is adjustably secured to rail 70 by bolts 111 extending through slots 112 in the bar 110. The adjustable mounting of cams 108 and of cams 67 previously described permit the timing of the operation of the cams to be shifted to accommodate packages of different longitudinal extent.

In order to secure a neat appearance the rotary cutters 115 are mounted forwardly of the crimping rolls and positioned to trim the sidewise wrapper extensions adjacent the outer edge of the crimped zone of the extensions. As best shown in Figs. 2, 4 and 7, the cutters 115 are adjustably fixed at 116 on sleeve 117 which are splined at 118 to the shaft 89 and journaled in suitable anti-friction bearings 119 in the frame members 87. The cutters 115 act against platen rolls 120 between which the wrapper extensions are initially advanced by the crimping rolls. Just before the articles leave the crimping rolls, the pull fingers are released by cams 108 to again draw the article forwardly. The platen rolls 120 are mounted by means of anti-friction bearings 121 (Fig. 7) on the ends of studs 122 pivoted at 123 in frame members 87. Screws 124 bearing against the studs 122 intermediate their pivots and the platen rolls, adjustably hold the platen rolls in operative relation with the cutters. The relative transverse position of the platens and

cutters is established by adjusting the cutters on their sleeves 117. The frame members 87, and the crimpers and cutters carried thereby, may be moved toward and from each other on the supporting shafts 88 and 89, to which they are splined, by a shaft 125 reversely threaded, as at 126, at its opposite ends in the adjacent frame members 87. By rotation of shaft 125 the cutter and crimper assembiles may be adjusted to accommodate articles of different width. For convenience, and as shown, the adjusting rotation of shaft 125 is effected by a chain 128 passing around sprockets 129 and 130 carried respectively by shafts 125 and a shaft 131 (Fig. 3), later referred to, and which carries a hand wheel 132. Cutter shaft 89 is constantly driven by a chain 133 passing around sprockets 134 and 135 carried by shafts 89 and 102 respectively.

From the cutters the articles are drawn between side folders 138, Figs. 2 and 4, which are adjustably secured by brackets 139 to posts 140 carried by side frame members 141. The rear ends of side frame members 141 are adjustably bolted at 142 to the frame members 87 and at their forward ends are supported by shaft 136 secured at its ends in frame brackets 137, Figs. 3 and 4. The ends of shaft 131 are reversely threaded, as indicated at 144 in Fig. 5, in the forward ends of frame members 141 so that the latter with the parts carried thereby may be adjusted toward and from each other simultaneously with frame members 87, the frame members 87 and 141 making up the side members previously generally referred to as 75. The folders 138 by their engagement with the wrapper extensions fold the extensions downwardly at right angles to the plane of the articles. Continued movement of the articles brings the downwardly folded extensions into engagement with folders 143 which fold the wrapper extensions beneath the article and against the under side thereof. The folders 143 are secured by brackets 160 to the frame members 141.

Forwardly of the folders 143 suitable heating members, indicated at 146, Figs. 3 and 5, are provided to seal the underfolded wrapper extensions to the under face of the package.

The completely wrapped and sealed articles are discharged onto a suitable conveyor such as belt 147 trained around a pulley 148 fixed to a shaft 149.

The shaft 47 from which chain 44 is driven is provided with a sprocket 150 connected by a sprocket chain 151 to a sprocket 152 fixed to one end of a cross shaft 153, Figs. 3 and 5, the opposite end of which carries a sprocket 154. A sprocket chain 155 passes over sprocket 154, an idler tightening sprocket 156, a sprocket 157 on shaft 149, a sprocket 158 on shaft 38 and around a sprocket 159 (Fig. 2) on shaft 102 which is driven by a chain 165 (Fig. 1) from shaft 166 driven by an electric motor or other source of power, not shown. Chain 44 is driven at the same lineal speed as belt 35. Previously mentioned conveyor 1 is constantly driven from sprocket 167 fixed to the shaft 166.

Preferably, additional pressure is applied to the underturned edges of the wrapper. For this purpose, see Figs. 3 and 5, arms 161 pivoted on pins 162 are provided with rolls 163 which ride on the packages as the latter are discharged from the machine.

As the forward edge of the articles reaches the end of belt 35, the fingers 39 are raised, to release the articles, by cams 168, Figs. 3 and 5, which are engaged by the cam rolls 58 previously described. The cams 168 are secured to the side plates 52.

The above described arrangement of a constantly traveling belt and pulling fingers between which the forward edge of the articles are gripped in combination with means for releasing the pulling fingers during the time the articles are under the control of the crimping fingers makes possible the wrapping of extremely thin articles. Further, such arrangement with the arrangement by which the articles are held closely adjacent the side edges at which the crimping, trimming and folding operations take place makes possible the wrapping of articles which are not only extremely thin, but also extremely limp and flexible.

What is claimed is:

1. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave portions of the wrapper extending outwardly from the sides of the article; constantly traveling means to releasably clamp the forward edge portion of the article to pull the article forwardly, constantly driven crimping rolls at the side of the path of movement of the article and positioned to engage the said extending portions of the wrapper between them and means to release the article from said clamping means during the period that the wrapper extensions are between the crimping rolls to permit the latter to freely advance the article during the crimping operation.

2. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave upper and lower portions of the wrapper extending outwardly from the sides of the article; constantly traveling clamping means to releasably clamp the forward edge portion of the article to pull the article forwardly, crimping rolls at the side of the path of movement of the article and positioned to engage the said extending portions of the article between them, means to heat said crimping rolls, means acting on said clamping means to release the article therefrom as the wrapper extensions enter the crimping rolls, means to drive the crimping rolls to advance the article and simultaneously crimp the upper and lower portions of the wrapper extensions together, and means acting on said clamping means to cause the latter to again clamp the forward edge portion of the article as the wrapper extensions are released by the crimping rolls.

3. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave upper and lower portions of the wrapper extending outwardly from the sides of the article; constantly traveling means including means to releasably clamp the forward edge portion of the article to said constantly traveling means to pull the article forwardly, crimping rolls at the side of the path of movement of the article and positioned to engage the said extending portions of the article between them, means to heat said crimping rolls, means acting on said clamping means to release the article from said constantly traveling means as the wrapper extensions enter the crimping rolls, means to drive the crimping rolls to advance the article and simultaneously crimp the upper and lower portions of the wrapper extensions together, means forwardly of the crimping rolls to trim the edge portions of the crimped wrapper extensions to predetermined width, and means acting on said clamping means

to again clamp the forward edge portion of the article to said constantly traveling means as the wrapper extensions are released by the crimping rolls.

4. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave upper and lower portions of the wrapper extending outwardly from the sides of the article, a constantly traveling belt, means to advance the forward edge portion of the so-partially wrapped article into overlying relation with said belt, means to press the forward edge portion of the article into clamped engagement with said belt to draw the article forwardly, constantly driven pairs of crimping rolls spaced from the side of the belt and in the path of said extending portion of the wrapper, means to release the article from the belt during the passage of the wrapper extensions through the crimping rolls, means to trim the crimped wrapper extensions to predetermined width, and means to fold the trimmed wrapper extensions against one face of the article.

5. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave upper and lower portions of the wrapper extending outwardly from the sides of the article; a folding channel, an endless belt extending longitudinally of the folding channel, the upper run of said belt forming the floor of said channel, means to constantly drive said belt, means to advance the forward edge portion of successive, so-partially wrapped articles into overlying relation with said belt, an endless chain conveyor positioned above the belt, means to constantly drive said conveyor at the same lineal speed as the belt, and a series of spaced spring pressed fingers carried by the chain and positioned to engage with the said forwardly advanced edge portion only of the articles presented to the belt to clamp said portion of the articles to the belt to pull the articles through the folding channel.

6. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave upper and lower portions of the wrapper extending outwardly from the sides of the article; a folding channel, an endless belt extending longitudinally of the folding channel, the upper run of said belt forming the floor of said channel, means to constantly drive said belt, means to advance the forward edge portion of successive, so-partially wrapped articles into overlying relation with said belt, an endless chain conveyor positioned above the belt, means to constantly drive said conveyor at the same lineal speed as the belt, a series of spaced spring pressed fingers carried by the chain and engageable with the said forward edge portion of the articles presented to the belt to clamp the articles to the belt to pull the articles through the folding channel, two pairs of crimping rolls positioned one pair at each side of the folding channel and positioned in the path of the said extending portions of the wrapper to receive said extending portions between them, means to heat one roll of each pair, means to constantly drive said crimping rolls, and cam means to raise said fingers from the articles during the period that the wrapper extensions are between the crimping rolls to permit the latter to freely advance the article during the crimping operation.

7. In a machine for wrapping thin flat articles which includes means to fold a wrapper around an article to leave upper and lower portions of the wrapper extending outwardly from the sides of the article; a folding channel, an endless belt extending longitudinally of the folding channel, the upper run of said belt forming the floor of said channel, means to constantly drive said belt, means to advance the forward edge portion of successive, so-partially wrapped articles into overlying relation with said belt, an endless chain conveyor positioned above the belt, means to constantly drive said conveyor at the same lineal speed as the belt, a series of spaced spring pressed fingers carried by the chain and engageable with the said forward edge portion of the articles presented to the belt to clamp the articles to the belt to pull the articles through the folding channel, two pairs of crimping rolls positioned one pair at each side of the folding channel and positioned in the path of the said extending portions of the wrapper to receive said extending portions between them, means to heat one roll of each pair, means to constantly drive said crimping rolls, cam means to raise said fingers from the articles during the period that the wrapper extensions are between the crimping rolls to permit the latter to freely advance the article during the crimping operation, stationary folders positioned at the sides of the channel to fold the crimped wrapper extension against one face of the article, and means intermediate the crimping rolls and said stationary folders to trim the edge portions of the crimped wrapper extensions to predetermined width.

8. In a wrapping machine which includes means to fold a wrapper around an article to leave portions of the wrapper extending outwardly from the sides of the article; a constantly traveling conveyor, means carried by the conveyor for releasably engaging the article to move it forwardly, constantly driven crimping rolls at the sides of the path of movement of the article and positioned to engage the said extending portions of the wrapper between them, and means to release said article engaging means during the period that the wrapper extensions are between the crimping rolls to permit the latter to freely advance the article during the crimping operation.

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