

Oct. 22, 1957

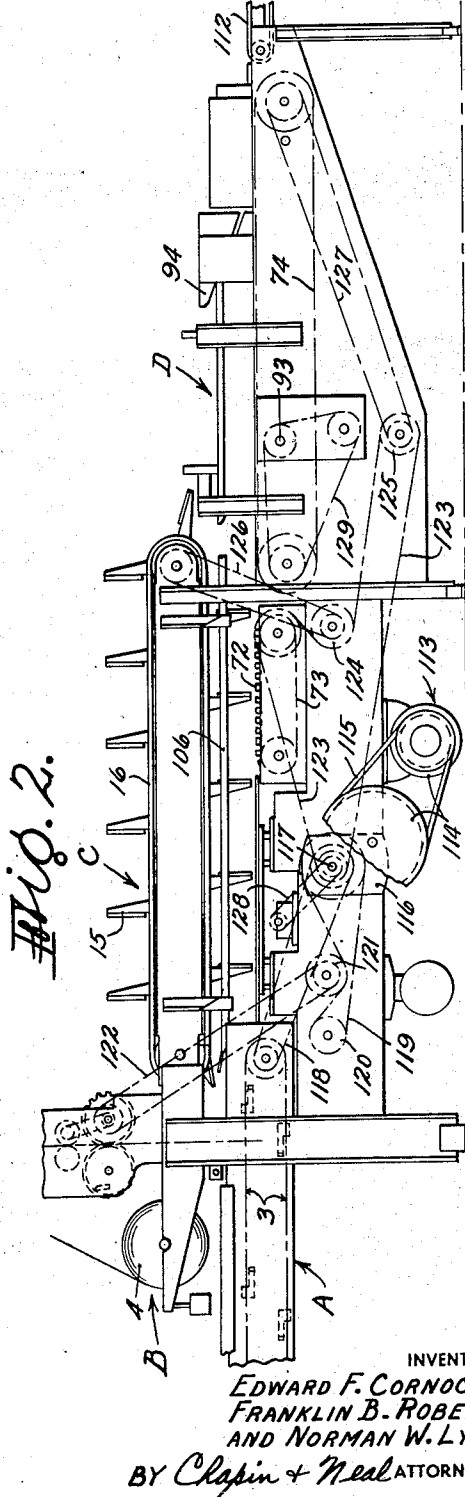
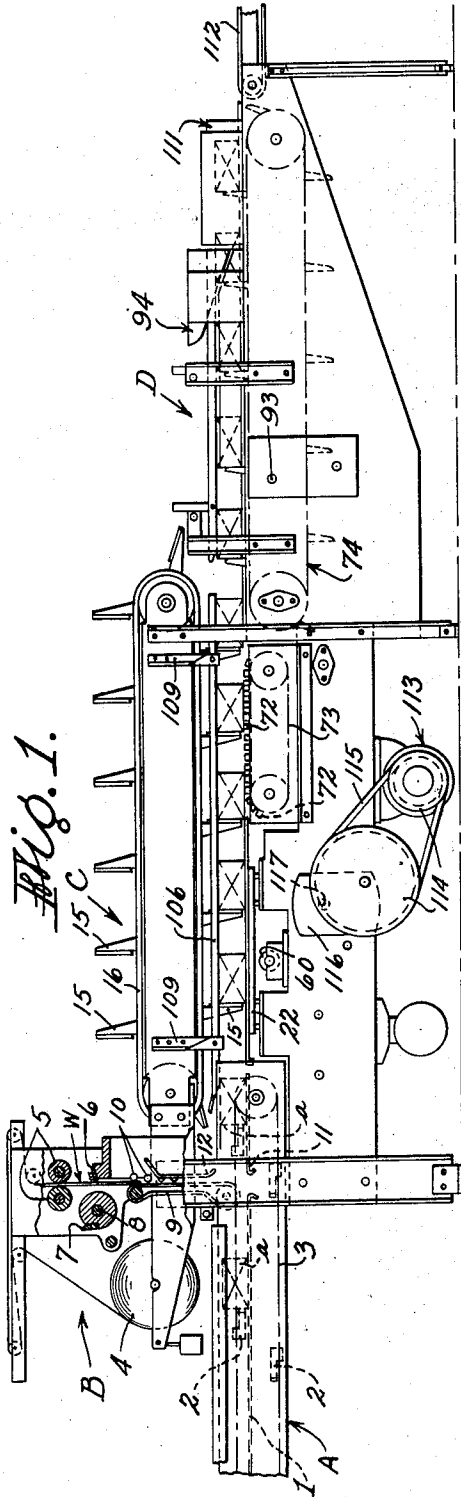
E. F. CORNOCK ET AL

2,810,246

WRAPPING MACHINE

Filed June 28, 1954

18 Sheets-Sheet 1



INVENTORS  
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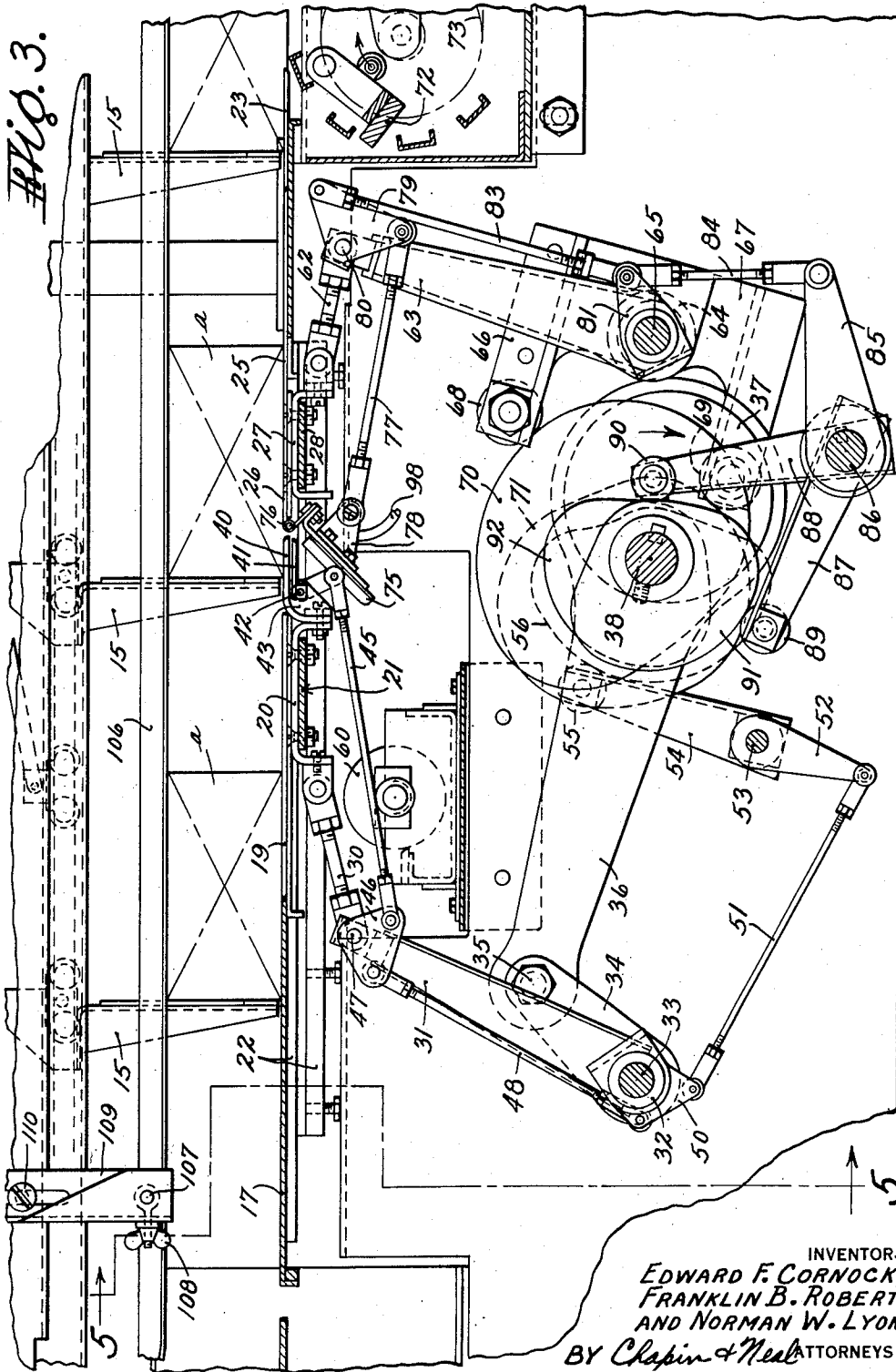
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WRAPPING MACHINE

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18 Sheets-Sheet 2



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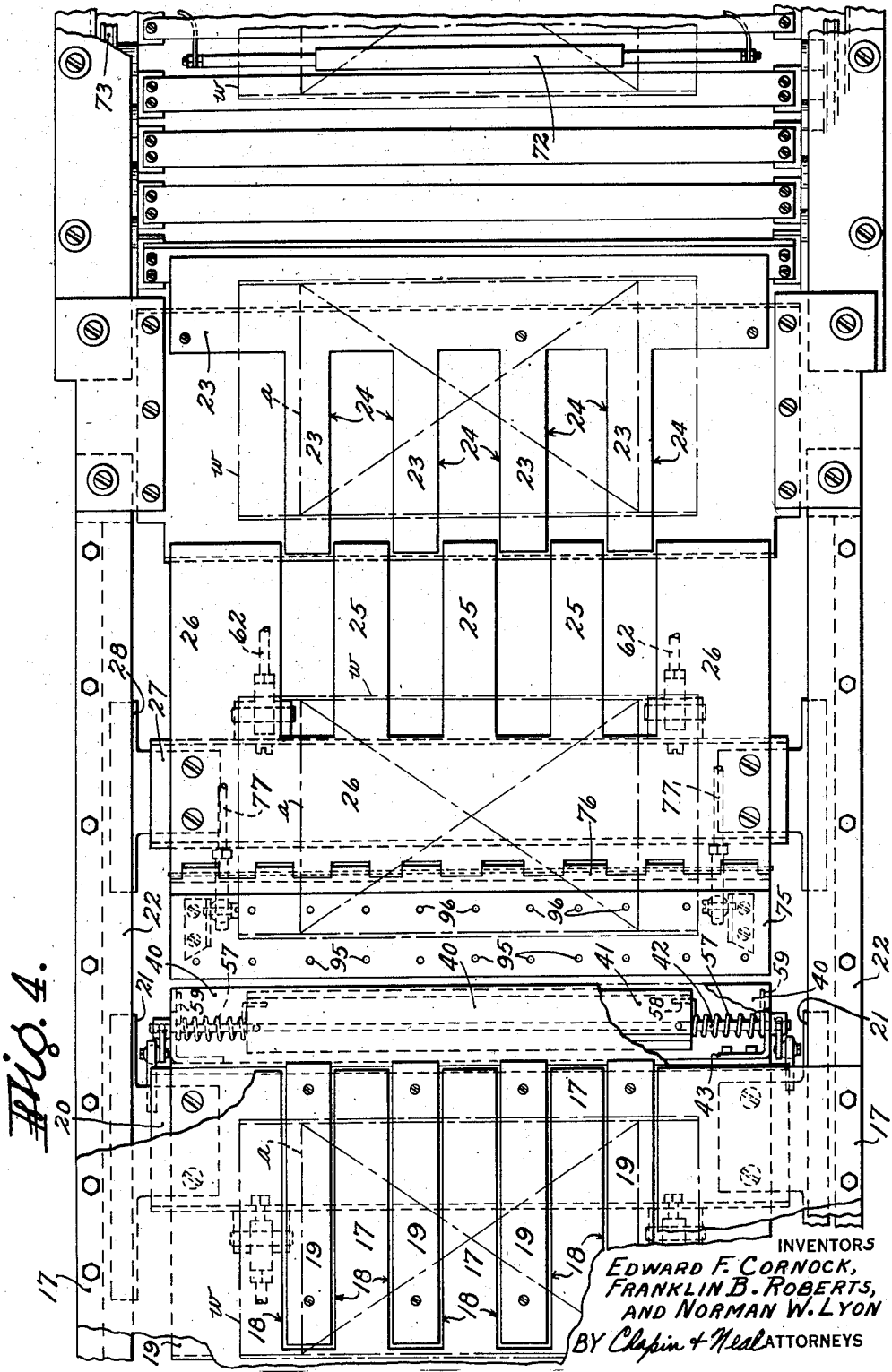
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WRAPPING MACHINE

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18 Sheets-Sheet 3



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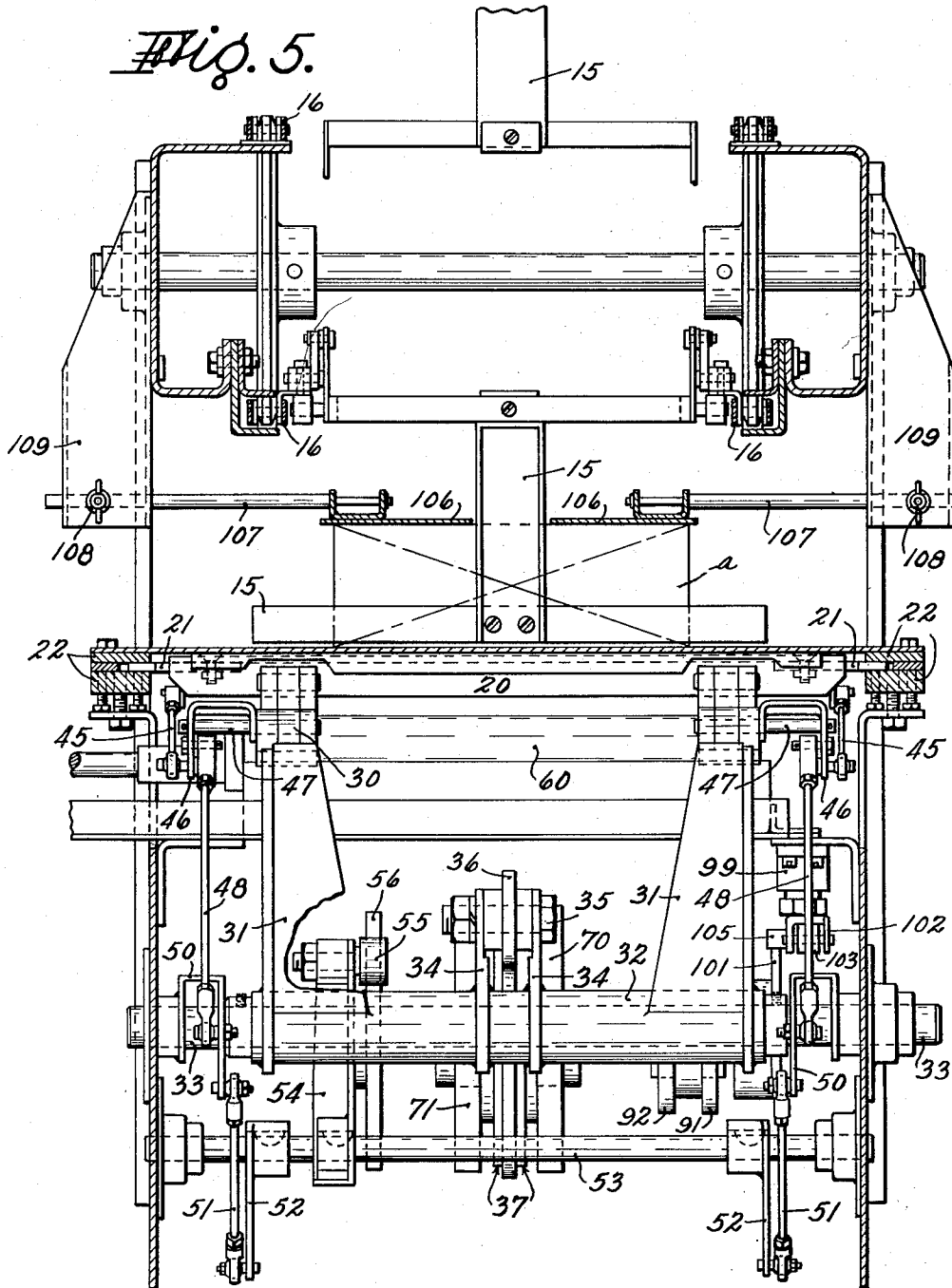
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18 Sheets-Sheet 4



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18 Sheets-Sheet 5

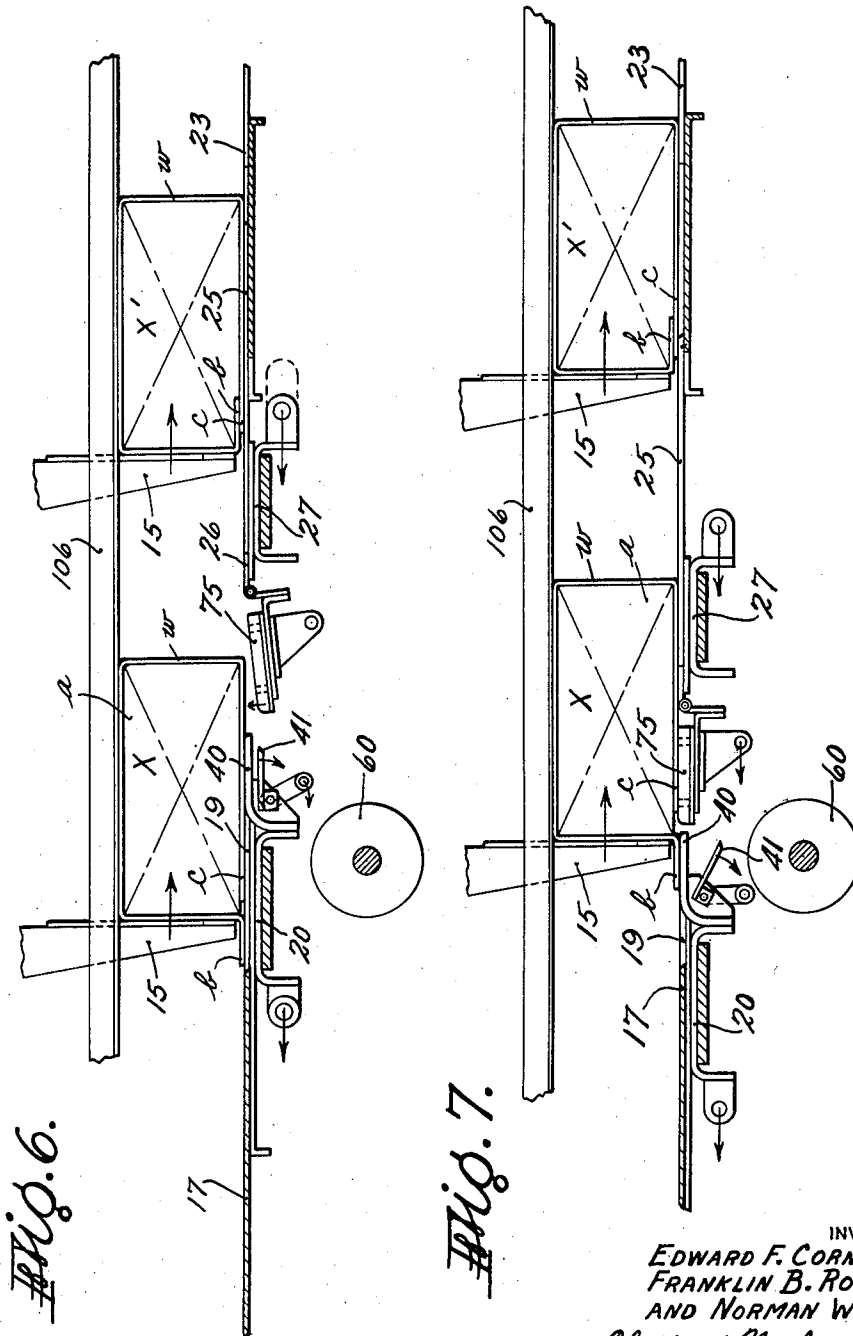


Fig. 6.

Fig. 7.

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18 Sheets—Sheet 6

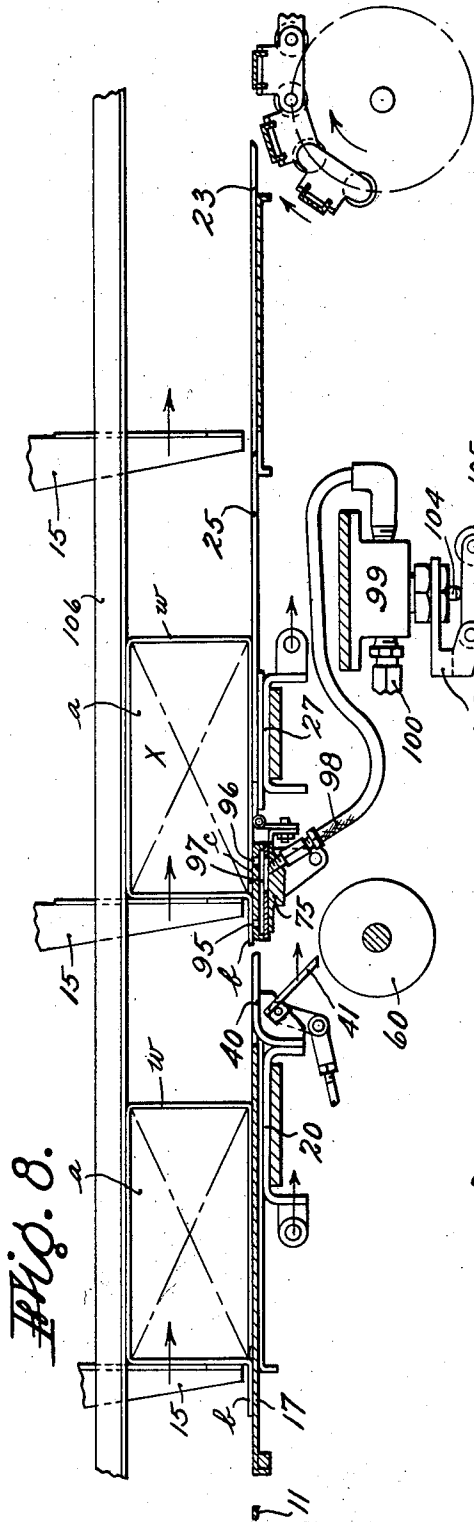


Fig. 8.

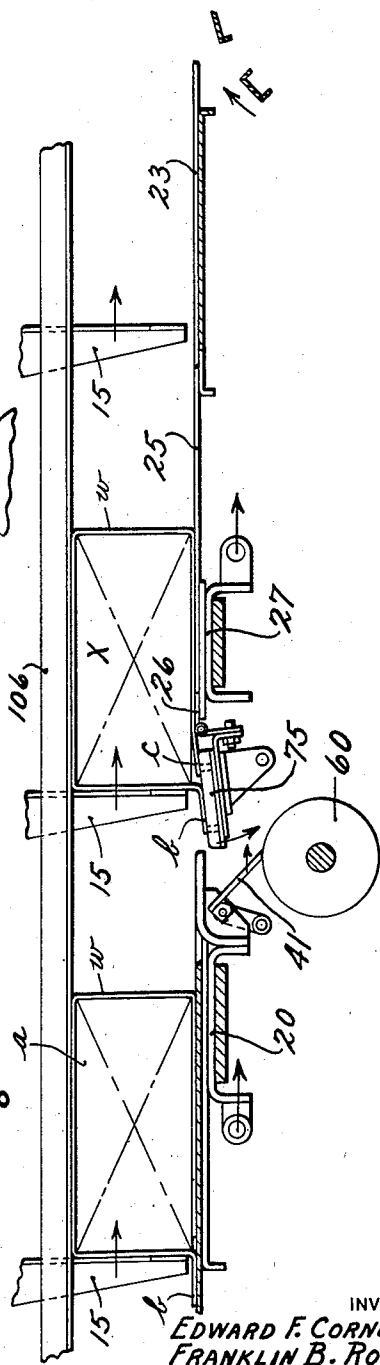


Fig. 9.

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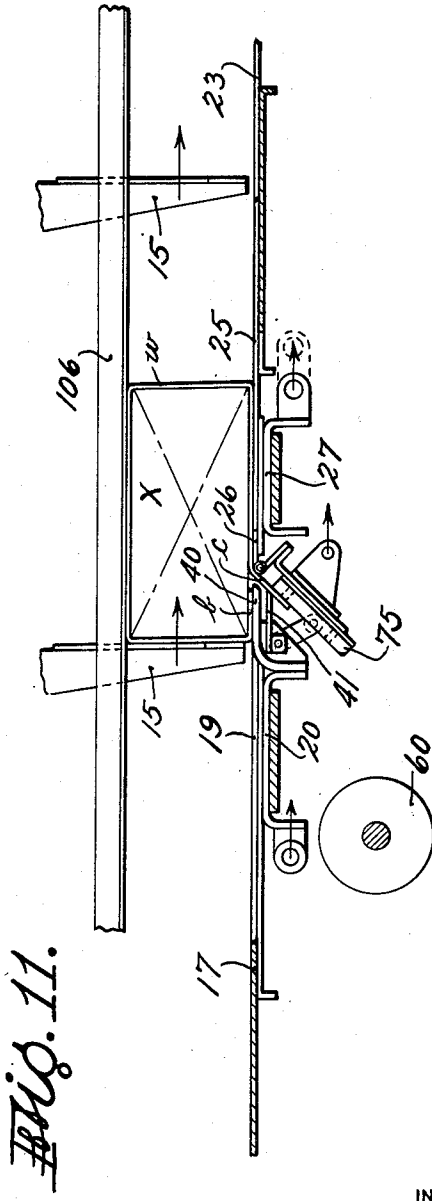
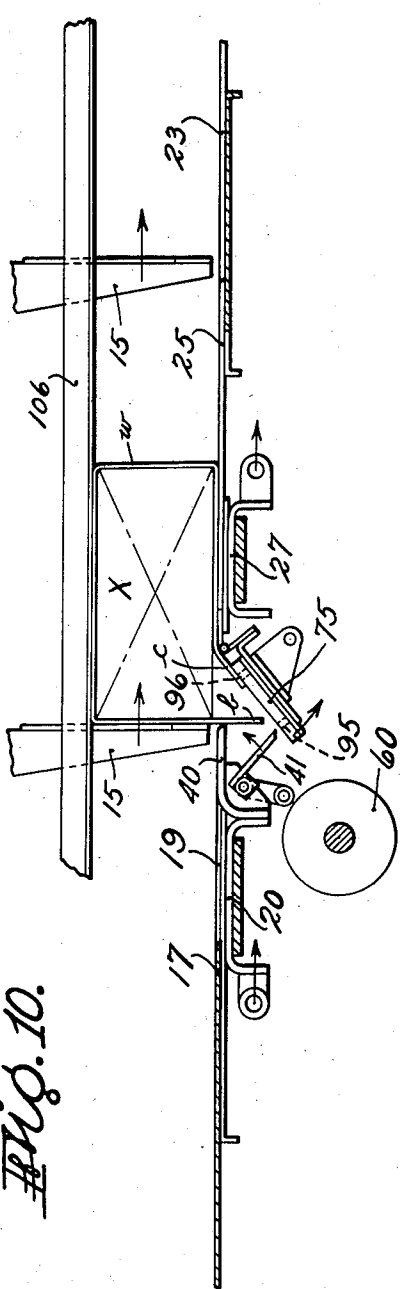
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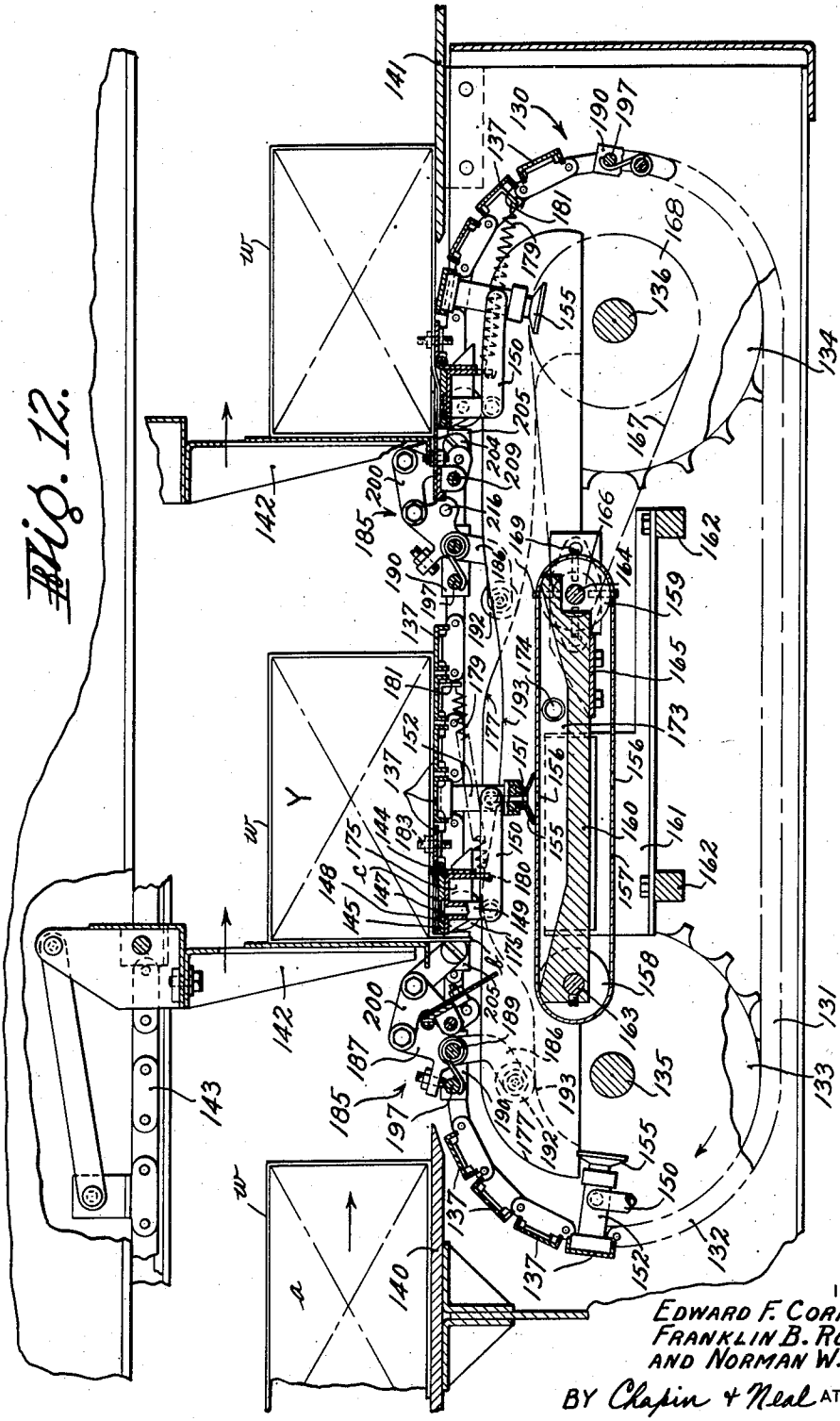
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18 Sheets-Sheet 8



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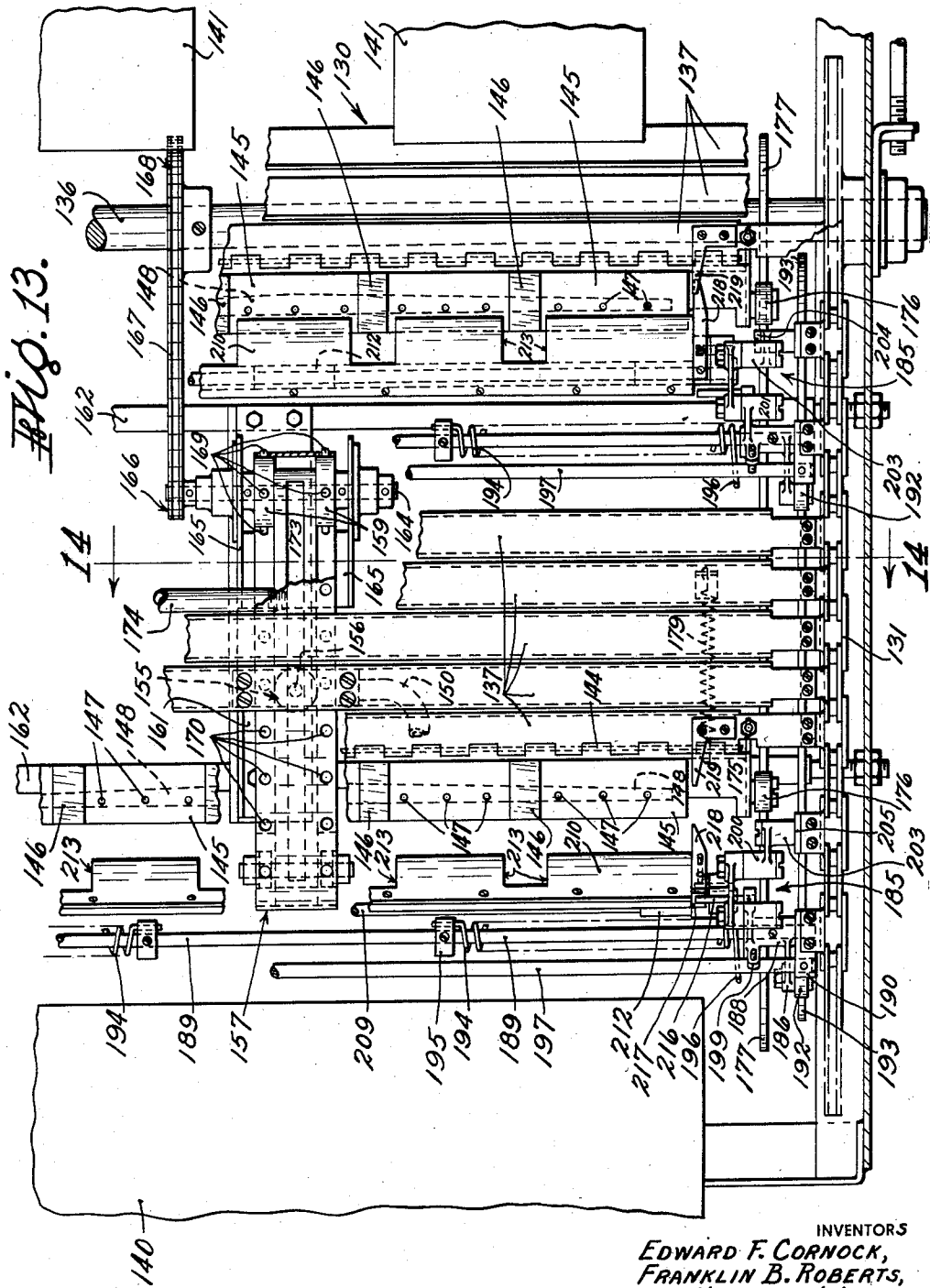
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18 Sheets-Sheet 10

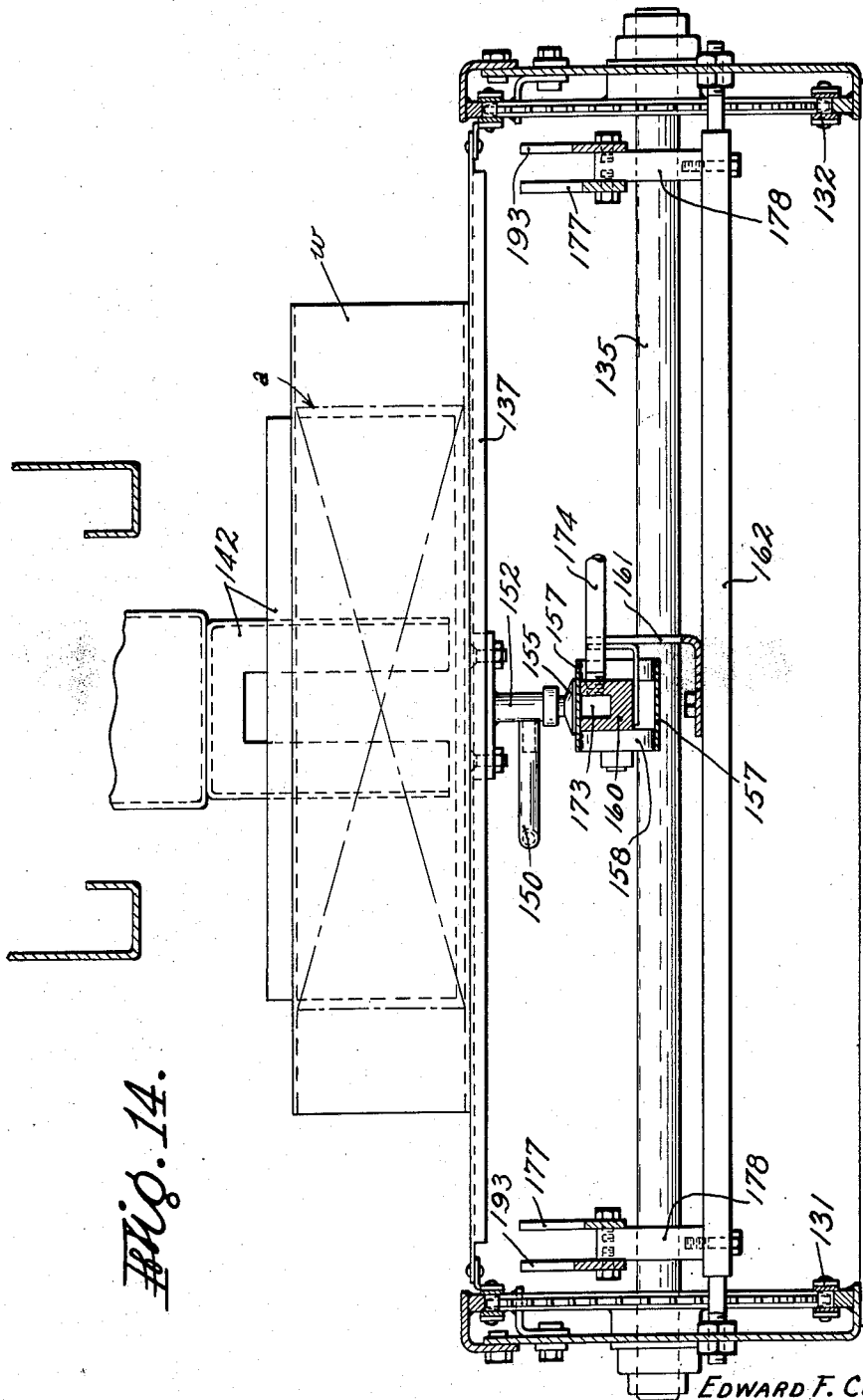


Fig. 14.

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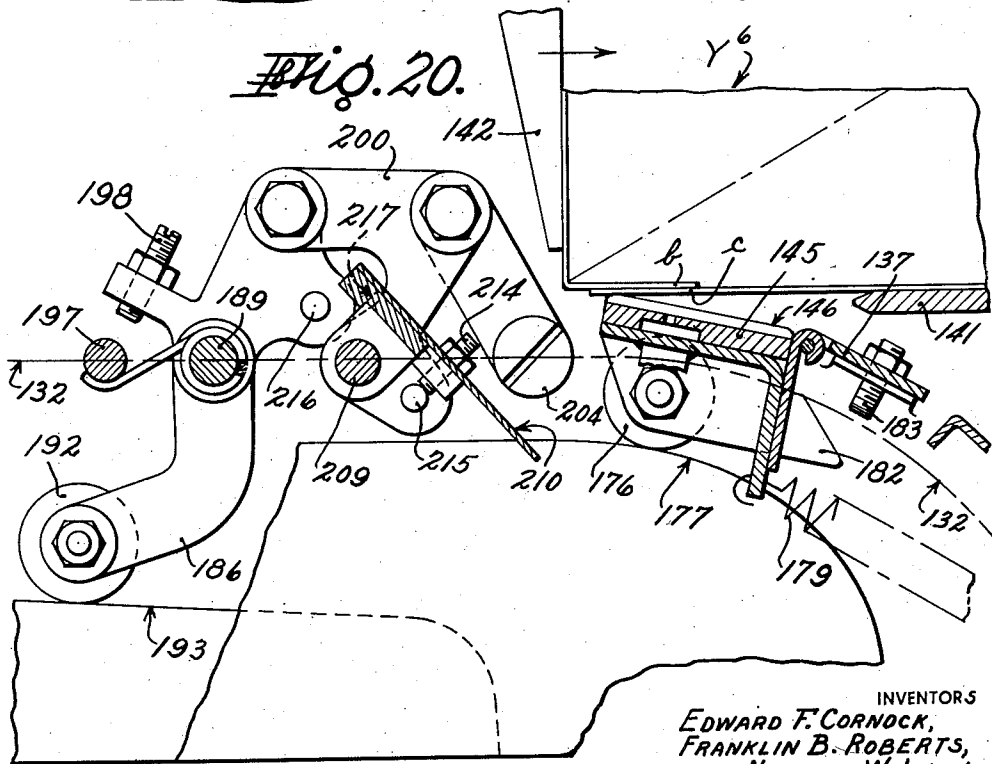
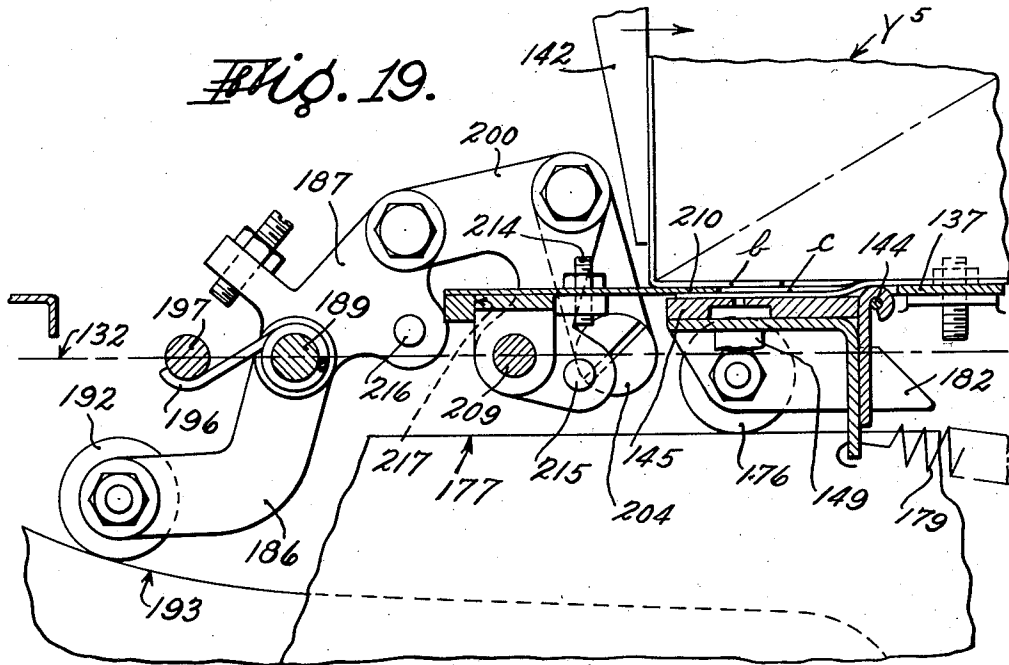
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WRAPPING MACHINE

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18 Sheets-Sheet 13



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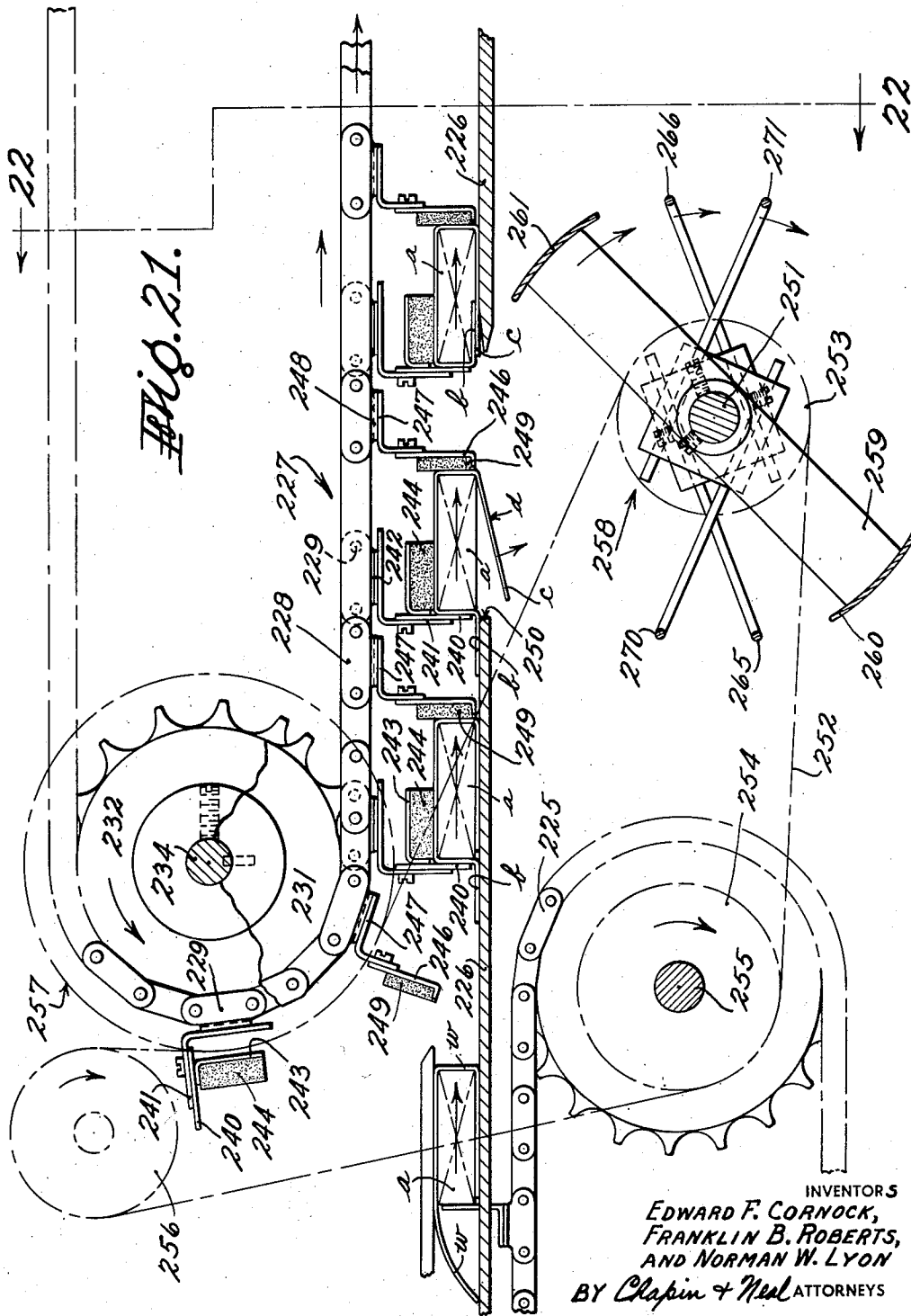
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WRAPPING MACHINE

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18 Sheets-Sheet 14



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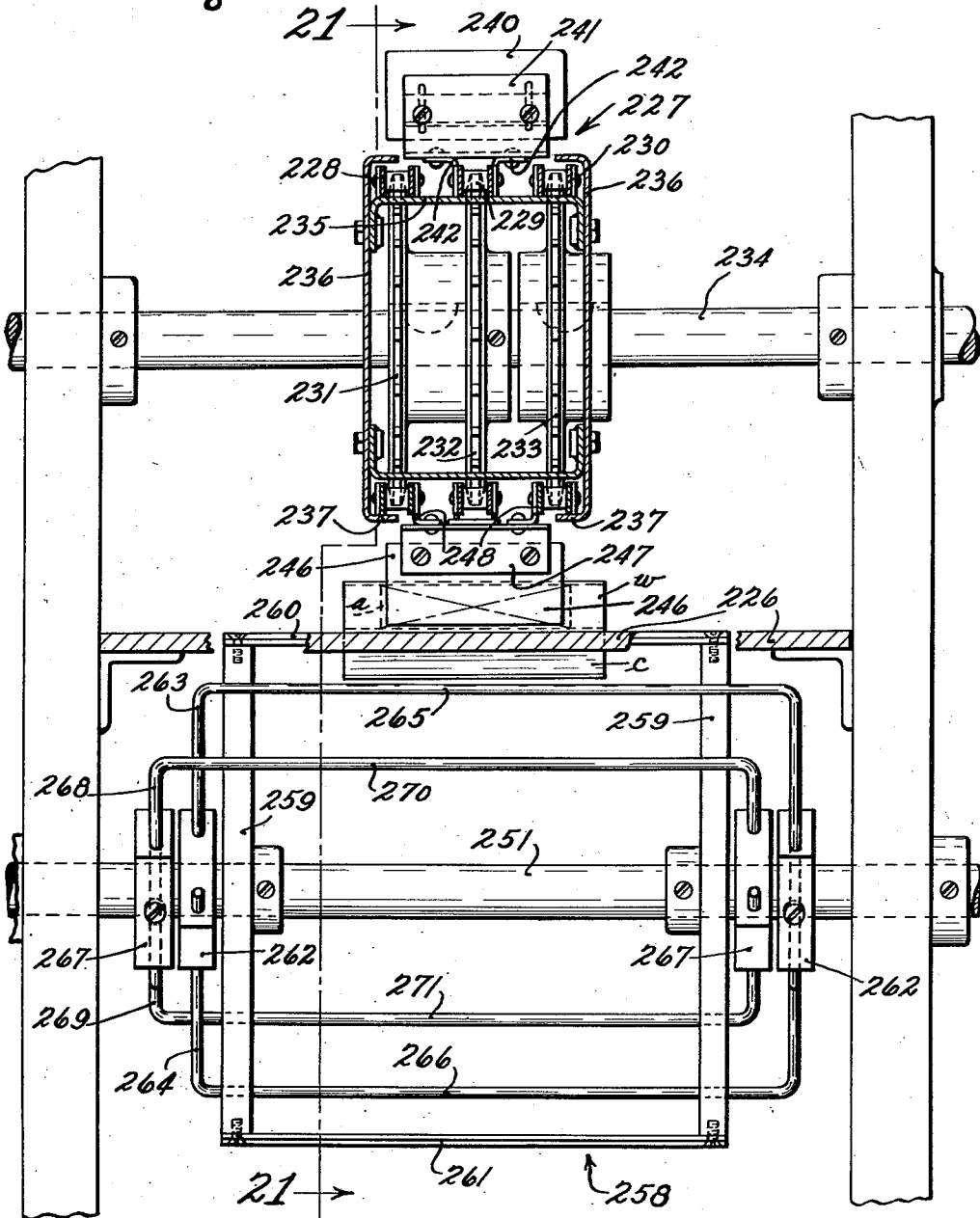
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*Fig. 22.*



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Fig. 24.

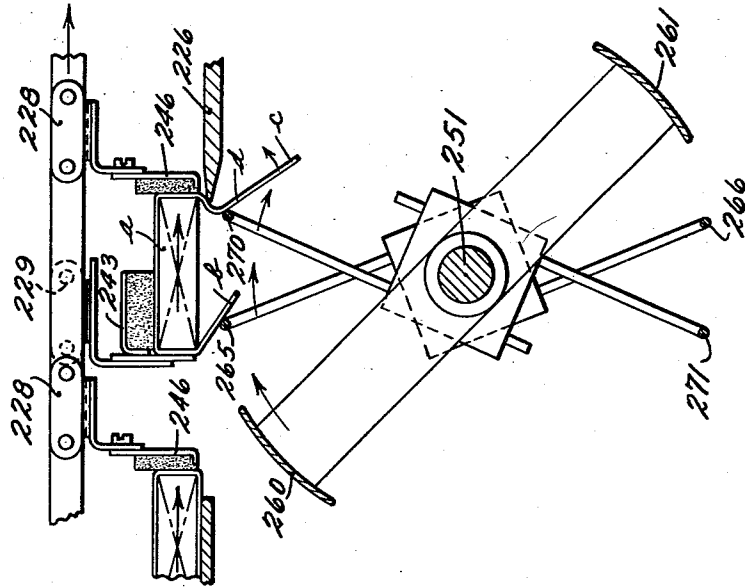
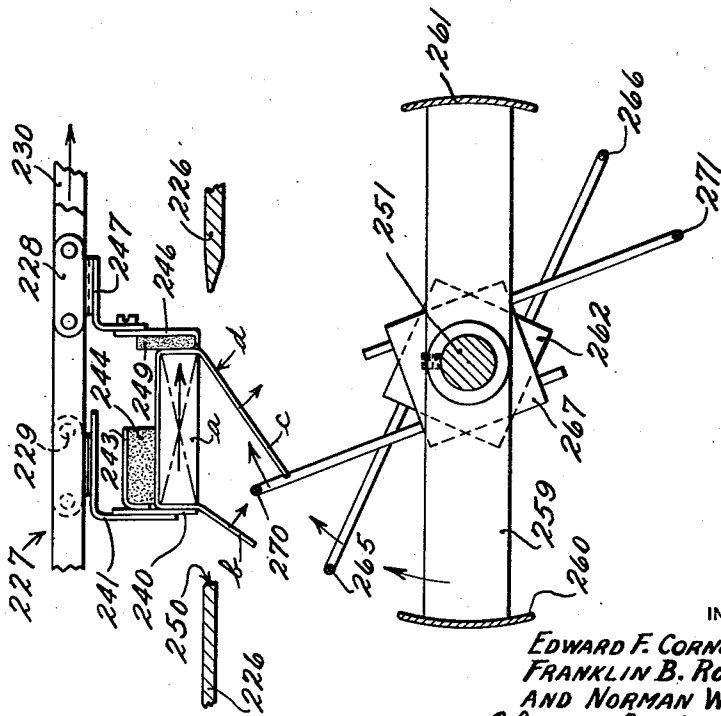


Fig. 23.



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Fig. 26.

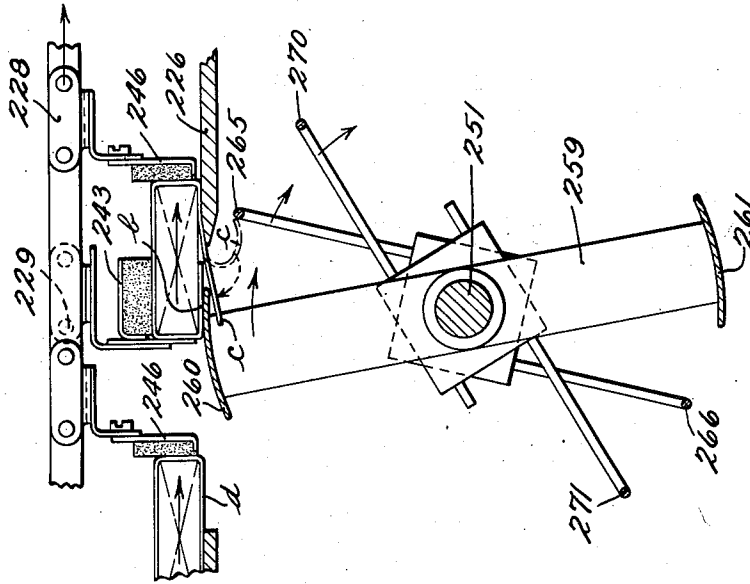
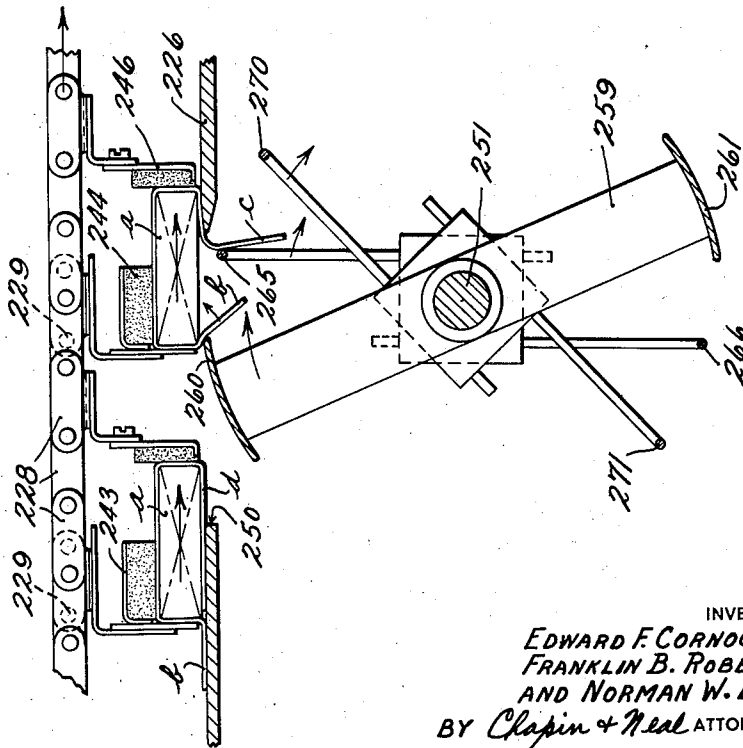


Fig. 25.



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Fig. 28.

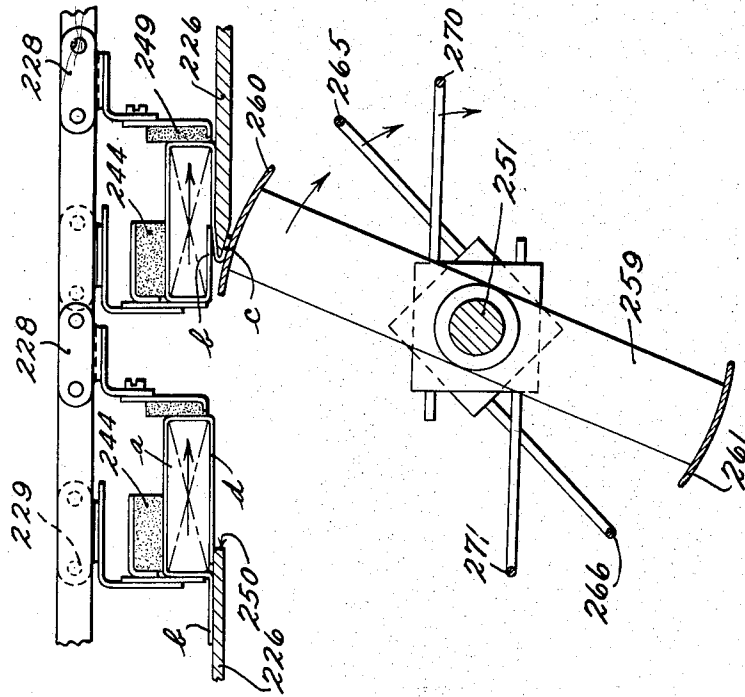
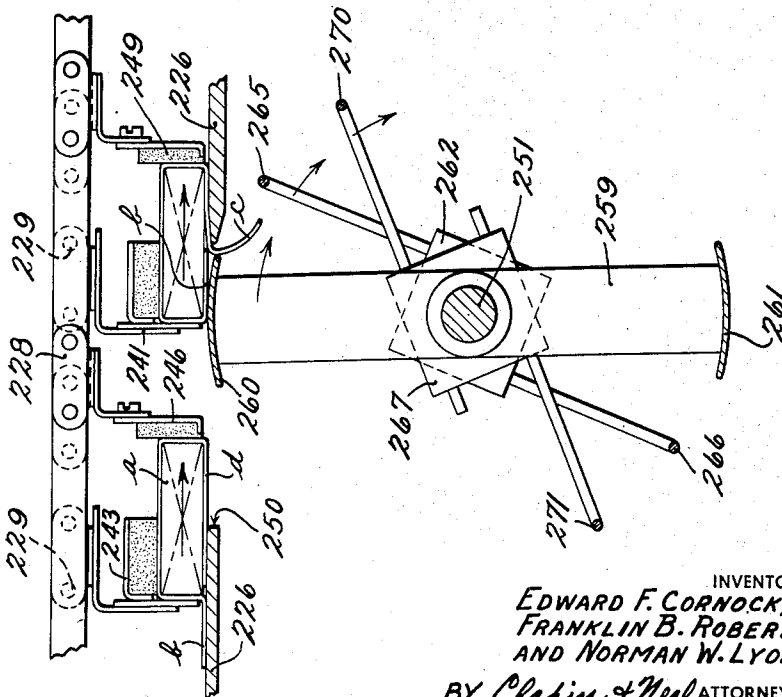


Fig. 27.



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## WRAPPING MACHINE

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Application June 28, 1954, Serial No. 439,682

17 Claims. (Cl. 53—228)

This invention relates to wrapping machines for wrapping generally rectangular articles.

The object of the invention is to provide apparatus for encircling the packages with a wrapper as the packages are carried in a continuous straight line movement through the machine.

It is a particular object of the invention to provide means to fold or insert the rear transverse edge portion of the wrapper beneath the forward transverse edge of the wrapper on a face of the article which lies in the plane of its travel as the article is being constantly advanced by a continuously operating conveyor.

Other and further objects will be made apparent in the disclosure of the accompanying drawings and in the following specification and claims.

In the accompanying drawings:

Fig. 1 is a side elevational view of a wrapping machine embodying the invention;

Fig. 2 is a similar view showing the manner of driving the various instrumentalities;

Fig. 3 is a side elevational view, on a larger scale, showing the mechanism for folding the forward and rear portions of the wrapper in overlapping relation on the bottom of the article;

Fig. 4 is a plan view of the structure shown in Fig. 3, the conveyor being omitted;

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

Figs. 6 to 11 inclusive are diagrammatic views showing the sequence of operations in forming the underfold;

Fig. 12 is a view similar to Fig. 3 but showing an alternative underfolding arrangement;

Fig. 13 is a plan view of the structure shown in Fig. 12, parts broken away;

Fig. 14 is a sectional view substantially on line 14—14 of Fig. 13;

Figs. 15 to 20 inclusive are diagrammatic views showing the sequence of operations in forming the underfold by the mechanism of Figs. 12, 13 and 14;

Fig. 21 is a view similar to Figs. 3 and 12 but showing another alternative underfold mechanism and taken generally on line 21—21 of Fig. 22;

Fig. 22 is a sectional view substantially on line 22—22 of Fig. 21 but showing the lapping mechanism in the relative position of Fig. 27; and

Figs. 23 to 28 inclusive are diagrammatic views showing the sequence of operations performed by the mechanism of Figs. 21 and 22.

Referring to Fig. 1, the machine includes an article infeed conveyor mechanism generally indicated at A, a wrapper feed generally indicated at B, an underfold wrapping mechanism generally indicated at C, and end folding mechanism generally indicated at D.

Referring to Fig. 1 the articles *a* are fed into the machine over a supporting plate or table 1 by a series of U-shaped pushers 2 carried by continuously operating chains 3. A web of wrapping paper *W* is drawn downwardly from a supply roll 4 by feed rolls 5. The web is

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advanced by the feed rolls 5 between a stationary knife 6 and a rotating knife 7 carried by a shaft 8, knives 6 and 7 cooperating to sever a wrapper sheet from the end of the web *W*. As a wrapper *w* is severed from the web *W* the wrapper is advanced, as by belts 9 and rolls 10, transversely of the path of the incoming articles and the advancing article picks up the wrapper, and the article and wrapper are carried forward onto a plate 11 and beneath a stationary folding member 12 to fold the wrapper around the leading face of the article with portions folded against the adjacent faces of the article, one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article as diagrammatically indicated in Fig. 1. It will be understood that any suitable wrapper web feeding and wrapper cutting and advancing means may be used.

As the article and wrapper approach the forward end of plate 11 the trailing end portion of the wrapper is engaged, forwardly of the trailing edge, by one of a plurality of pushers 15 carried by overhead chains 16, and, as best shown at the extreme left in Fig. 8, folds the intermediate portion of the trailing portion of the wrapper against the rear face of the article, the extreme end portion *b* of the wrapper extending rearwardly as shown in Fig. 8 as the article is advanced by the pusher 15 from plate 11 onto a table section 17.

As shown in Figs. 3, 4 and 5 the table 17 is provided with a series of slots 18 in which article supporting members 19 carried by a transverse bar or carriage 20 reciprocate, the ends of the transverse bar 20 being provided with guides 21 slidably mounted in ways 22 for reciprocable motion. Forwardly of table 17 and spaced therefrom is a second stationary table section 23 provided with slots 24 in which supporting members 25, extending from a plate 26, reciprocate. Plate 26 is carried by a second cross bar or carriage 27, the ends of which are provided with guide members 28 slidably mounted in the ways 22.

As shown in Figs. 3 and 5 cross bar 20 is reciprocated in ways 22 by links 30 pivoted at their forward ends to cross bar 20 and at their rear ends to the upper end of arms 31 fixed to a sleeve 32 rotatable on a stationary cross shaft 33. Sleeve 32 carries spaced arms 34 between which is pivoted, at 35, a crank 36 mounted on an eccentric 37 fixed to drive shaft 38. Cross bar 20 carries a forwardly extending supporting member 40 beneath which is pivoted an adhesive applying blade 41 fixed to a rock shaft 42 journaled in bracket 43. The rock shaft 42 carries arms 44 connected by links 45 to rocker plates 46 mounted on the pivot pins 47 which connect the links 30 to the arms 31. The rocker plates 46 are connected by links 48 to rocker plates 50 pivotally mounted on the stationary shaft 33. The rocker plates 50 are connected by links 51 to arms 52 fixed to a rocker shaft 53 to which is fixed an arm 54 provided with a cam roll 55 engaging a cam 56 fixed to shaft 38.

Adhesive applying blade 41 is biased toward the horizontal position shown in Fig. 3, and roll 55 held against cam 56 by torsion springs 57 (Fig. 4) surrounding rock shaft 42 having one end fixed as at 58 and the other end engaging the underside of the blade 41 as indicated at 59.

As bar 20 is reciprocated by eccentric crank 36, a blade 41 is periodically rocked by cam 56 into engagement with a glue supply roll 60 as later more fully described.

The second carriage or cross bar 27 (Figs. 3 and 4) is reciprocated in timed relation with bar 20 by means of links 62 connected at one end to the bar and at the other end to arms 63 fixed to a sleeve 64 rotatable on a fixed shaft 65. Sleeve 64 carries arms 66 and 67 provided with respective cam rolls 68 and 69 which engage

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dual cams 70 and 71 respectively fixed on drive shaft 38 and by which reciprocating motion is imparted to bar 27 and the parts carried thereby.

A suction member 75 is hinged at 76 to the plate 26. Member 75 is oscillated, for purposes later described, by links 77 connecting brackets 78, fixed to member 75, to rocker plates 79 mounted on the pivot pins 80 which connect links 62 to arms 63, rocker plates 79 being connected to arms 81 fixed to the sleeve 64 by links 83. One of the arms 81 is connected by a link 84 to an arm 85 fixed to a rock shaft 86 which carries arms 87 and 88 provided with respective cam rolls 89 and 90. The cam rolls 89 and 90 engage dual cams 91 and 92 by which oscillatory movement is imparted to suction member 75.

Suction member 75 is formed with spaced rows of openings 95 and 96 which as best shown in Fig. 8 are in communication with a chamber 97 to which suction is supplied through a tube 98 by way of a control valve 99 in line 100 which connects with any suitable vacuum source, not shown. Valve 99 is actuated to turn the vacuum supply to member 75 on and off, in a timed sequence and for a purpose later described, by a cam 101 fixed to shaft 38. A bracket 102 suspended from the valve casing carries a pivoted arm 103 which engages the valve stem 104 of the valve and carries a cam roll 105 which is held against the cam by a spring, not shown, located in the valve and biasing the valve stem to valve closing position.

As the articles are carried over the supporting surfaces 17, 19, 26, 25 and 23 they pass beneath suitable adjustable hold down and guide plates 106, Figs. 3 and 5, carried by rods 107 mounted for horizontal adjustment at 108 in brackets 109 which brackets are mounted for vertical adjustment at 110 to the machine frame.

The operation of the machine will now be described with reference to Figs. 6 to 11 inclusive. The articles are constantly advanced by the pushers 15 over the several supporting surfaces while the instrumentalities carried by the cross bars 20—27 are reciprocated beneath them.

Referring to Fig. 6, as an article *a* and its wrapper are being advanced by the pusher 15 to position X the bars 20—27 are moving rearwardly, the suction member 75 is completing its upward swing into the plane of the article supporting surfaces and glue blade 41 is starting its downward swing.

In Fig. 7 the bars are continuing their rearward movement, suction member 75 is in the supporting plane with the article passing thereover and trailing portion *b* of the wrapper is about to leave the support 40.

In Fig. 8 the bars 20—27 have reached their rearmost point of travel and are advancing with, but at a slightly less speed than pushers 15 and the article. Glue blade 41 is about to contact supply roll 60—trailing wrapper portion *b* is over the openings 95, the trailing edge portion *c* of the underfold of the wrapper is over openings 96 and valve 99 has been opened to supply vacuum to the member 75 and hold portions *b* and *c* to the member 75.

In Fig. 9 the blade 41 is receiving glue from the roll 60 and member 75 has commenced to swing downwardly with the wrapper portions *b* and *c*, to clear the latter portion from the adjacent face of the article.

In Fig. 10 the member 75 is approaching the completion of its downward swing—the glue blade is approaching the completion of its upward swing. Wrapper portion *c* is still held by the suction member but portion *b* has been drawn from the suction member and is about to be engaged by the overtaking member 40.

In Fig. 11 the overtravel of bars 20—27 relative to the travel of pushers 15 has brought blade 41 into contact with wrapper portion *c* to apply adhesive thereto and has caused supporting member 40 which is now traveling at a speed in excess of that of the article to fold wrapper

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portion *b* against the underside of the package. Blade 41 and member 75 dwell in the positions shown in Fig. 11 as the bars 20—27 move with decelerating speed to their extreme position of forward movement, indicated in dotted lines, the continued movement of the article by pusher 15 carrying the article onto surfaces 26—25 and laying the wrapper portion *c* in adhering lapping relation against portion *b*, as indicated at article position X<sup>1</sup> in Fig. 6.

The article is thus encircled by the wrapper with the edge portion *b* and *c* brought into the described lapping relation while the article is being constantly advanced in a straight line path. On the succeeding rearward and forward movement of the bars 20—27 the described sequence of operations are repeated on the article being advanced by the succeeding pusher 15.

Upon completion of the lapping of the leading end of the wrapper over the trailing end of the wrapper the pushers 15 may carry the package over heat sealers 72, Fig. 1, carried by a conveyor 73 which moves with the article. The pushers 15 deliver the wrapper encircled article to a second pusher conveyor 74 which carries the articles past suitable end folders such as a rotary folder 93 and stationary folders 94, which fold the sidewise extending portions of the wrapper over the adjacent sides of the article in any desired manner, and between suitable heat sealing plates 111 which seal the end folds to complete the wrapping operation, the wrapped articles being delivered by conveyor 74 to a delivery belt 112.

The various instrumentalities described are driven from a motor 113, Fig. 2, by pulleys 114 and belt 115, through a gear reduction box 116. From shaft 117 of box 116 a chain 118 drives infeed conveyor 3. A second chain 119 passing around an idler 120 drives a sprocket 121 from which the wrapper web feed rolls and cutter are driven by a chain 122. A chain 123 drives heater conveyor 73 and sprockets 124 and 125 from which respective chains 126 and 127 drive pusher conveyors 16 and 74, respectively. Glue supply roll 60 is driven by a chain 128 from shaft 117 and folder 93 is driven by a chain 129 from conveyor 108.

In Figs. 12 to 20 inclusive is shown an alternative arrangement in which the instrumentalities for lapping the leading edge of the wrapper over the trailing edge of the wrapper are carried by a constantly traveling conveyor instead of a reciprocating support as in the form previously described.

Referring to Figs. 12 and 13, the lapping instrumentalities are carried by a conveyor generally indicated at 130. Conveyor 130 comprises spaced chains 131 and 132 trained around pairs of sprockets 133 and 134 fixed to respective shafts 135 and 136. The chains 131 and 132 are connected by spaced groups of articulated article supporting slats 137 secured at their ends to opposed links of the chains. The conveyor 130 operates between spaced table surfaces 140 and 141. The articles are associated with a wrapper as previously described with an intermediate portion of the wrapper against the leading face of the article and the leading end portion of the wrapper laid against the under face of the article, the trailing portion being laid over the top face with the portion adjacent the trailing edge folded against the rear face of the article by the pushers 142 of the constantly driven conveyor 143 which carry the articles through lapping portions of the machine.

Conveyors 143 and 130 are driven at the same speed and, as is apparent from Fig. 12 as a pusher 142 advances an article from table 140 the article advances onto one of the groups of supporting slats 137, the trailing edge portion *b* of the wrapper swinging downwardly under the action of gravity at the rear of the article. Hinged at 144 to the rearmost slat of each group is a suction member 145 which underlies the leading edge portion *c* of the wrapper. The surface of member 145 is formed with spaced lands 146 between which are formed a series of

openings 147 communicating with a suction chamber 148 within member 145. Such is supplied to chamber 148 through a stem 149 extending downwardly from member 145 and connected by a flexible pipe 150 to conduit 151 formed in a stem 152 depending from the slat 137 forwardly of the slat to which member 145 is hinged. Conduit 151 terminates in a cup 155 adapted to engage over one of a pair of openings 156 formed in a belt 157 traveling around pairs of pulleys 158 and 159 rotatably supported at the ends of a suction box 160 supported by a bracket 161 supported on cross bars 162. Pulleys 158 are rotatably mounted on a shaft 163 fixed in the base of suction box 160. Pulleys 159 are fixed to a shaft 164 journaled in a U-shaped bracket 165 fixed to the suction box. Shaft 164 carries a sprocket 166 driven by a chain 167 from a sprocket 168 on shaft 136. Pulleys 159 are provided with pins 169 which engage in openings 170 formed in the edges of belt 157, thus driving the belt at the same surface speed as the conveyor 130.

Suction box 160 is formed with an upwardly opening chamber 173 which is closed by the belt 157 except when one of the openings 156 is passing over it. Suction is constantly supplied to chamber 173 through pipe 174 connected to a suitable source of suction, not shown. The belt 157 and box 160 are so dimensioned that as one cup 155 and opening 156 pass the forward end of the suction box, the next succeeding cup 155 engages over the second opening 156 as the latter passes over the rear end of the suction box and into communication with chamber 173.

Referring to Figs. 12, 14 and 15 the ends of suction member 145 are provided with brackets 175 which carry cam rolls 176, held, by springs 179, in engagement with cam plates 177, which are supported by posts 178 (Fig. 14) fixed to cross bars 162. Springs 179 are connected at one end to a flange 180 extending downwardly from the suction member and at the other end to a bracket 181 depending from one of the forward slats 137. Brackets 175 are formed with extensions 182 which are adapted to engage stop members 183 carried by the adjacent slats 137 as rolls 176 leave the cam plates 177 for their idle return along the lower run of the chains.

Positioned rearwardly of the suction members 145 and carried by the chains 131 and 132 in each of the spaces between the groups of supporting slats 137 is a folding unit generally indicated at 185.

Each unit 185, as best shown in Figs. 12, 13 and 15, comprise arms 186 and 187 extending from hubs 188 fixed to a rock shaft 189 adjacent each end thereof. The ends of shaft 189 are journaled in brackets 190 (one of which is shown in Fig. 12) secured to opposite links of chains 131 and 132. Each arm 186 is provided with a cam roller 192 which is held in engagement with a plate cam 193 by a torsion spring 194 surrounding shaft 189, one end of the spring being secured to a collar 195 fixed to shaft 189, and the other end 196 engaging beneath a cross rod 197 having its ends fixed in brackets 190. Stop screws 198, carried by lugs 199 extending from hubs 188 engage rod 197 to limit the movement of hubs 188 when rolls 192 leave cams 193 for their return travel along the lower rim of the chains.

Links 200 are pivoted at 201 to arms 187 and at 202 to one end of links 203, the other end of which is pivotally connected at 204 to brackets 205 secured to opposite links of chains 131 and 132.

Extending from each link 200 is an arm 208 which supports the ends of a shaft 209. A blade 210 is fixed to a cross bar 211 freely pivoted on shaft 209 by bearings 212 secured to the underside of the bar 211. Blade 210 is formed with slots 213 to accommodate the lands 146 on the suction member 145, for purposes latter described. Bar 211 carries, adjacent each end of blade 210, a stop 214, which when the parts are in the position of Fig. 15 engage pins 215 which extend from arms 208 and limit the clockwise movement of the blade 210 as viewed in

the latter figure. Pins 216 extending from arms 187 are adapted to engage shoulders 217 formed on the bar 211 to limit counterclockwise rotation of the blade when roll 192 is free of cam 193 during the lower return run of chains 131 and 132.

Referring to Fig. 12, as an article *a* is advanced from table 140 by pushers 142 it is deposited onto a group of supporting slats 137, and advances to the position *Y* of Fig. 12, suction being applied to the wrapper edge portion *c* which overlies suction member 145 which is held in horizontal position by its cams 177. Cam rolls 192 are traveling along the low portion of cams 193 and blade 210 is positioned rearwardly of wrapper edge portion *b* which as the article leaves table 140 has dropped to the depending position shown in Figs. 12 and 15.

As the conveyors and articles advance to the position *Y*<sup>1</sup> of Fig. 15, cam rolls 176 are descending toward the low portion of the cam 177 swinging suction member 145 downwardly and with it the leading wrapper edge portion *c* which is held against the member by suction effective through the openings 147 to clear portion *c* from the adjacent face of the article. The cam rolls 192 are about to ascend the high part of their cams 193.

In Fig. 16, the article and instrumentalities having advanced to position *Y*<sup>2</sup>, suction member 145 and the leading wrapper edge portion *c* have completed their downward swing. Cam rolls 192 and cams 193 have rotated shaft 189 and arms 187 clockwise, and through links 200 and 203 have speeded blade 210 forwardly relative to the article and upwardly, to fold the trailing wrapper edge portion *b* against the under face of the article.

As the article and the chain carried instrumentalities reach position *Y*<sup>3</sup>, as shown in Fig. 17, the folding of the wrapper edge portion *b* has been completed and said portion is being held against the article as cam rollers 192 travel along the high of cams 193 while cam rolls 176 are again ascending a high of cams 177 to swing the suction member 145 and the leading wrapper edge portion *c* into lapping relation with blade 210 and wrapper edge portion *b*.

At position *Y*<sup>4</sup>, Fig. 18, the suction member 145 has been brought to horizontal position. As will be understood from the previous description the portions of the wrapper edge portion *c* which overlie the lands 146 are brought directly against the wrapper edge portion *b* through the slits 213 in blade 210, while the portions of the edge portion *c* intermediate the lands are brought against the underside of blade 210. If desired adhesive may be applied, by any suitable means, not shown, to the face of the edge portion *c* which overlies the lands 146 or to the portions of edge portion *b* exposed through slots 213.

As the article and the chain carried instrumentalities move to position *Y*<sup>5</sup> of Fig. 19 cam rolls 176 riding on cams 177 maintain the suction member 145 in horizontal position, while cam rolls 192 descend on cams 193 to rock arms 186 and 187 counterclockwise, as viewed in said figure to withdraw blade 210 from beneath the article, blade 210 being held horizontal by its engagement between the article and suction member 145, while pin 215 moves away from stop 214.

Upon further advance of the article and instrumentalities to position *Y*<sup>6</sup> of Fig. 20 blade 210 clears the edge of member 145 and drops by gravity against pin 215, and on further advance of the conveyors pushers 142 carry the articles onto and over table 141 and to suitable heat sealers and end folding instrumentalities as previously described. As the chains 131 and 132 round the sprockets 134 cam rolls 176 leave cams 177 permitting stops 182 and 183 to engage during the return of the suction member 145 along the lower run of the chains, and similarly rolls 192 leave cams 193 permitting stops 197 and 198 to engage for the return movement of blade 210 along the lower run of the chains. As will be apparent successive articles as they are advanced by

successive pushers 142 are acted upon by successive groups of lapping instrumentalities as the articles move continuously in a straight line path. Shaft 136 is constantly driven from any suitable source of power such as a motor, not shown.

The mechanism just described is capable of operation at high speed and at such higher operative speeds there is a tendency for the blade 210, when the parts move rapidly from the position of Fig. 15 to that of Fig. 17, to be thrown upwardly and around its pivot shaft 209 if an article is absent. To prevent this top members 218, Fig. 13, are provided at opposite ends of blade 210 which are adapted to engage beneath fingers 219, fixed to the slat 137 to which member 145 is hinged, when the parts are in the position shown at the right in Fig. 13. Members 218 and 219 have been omitted in Figs. 12, and 15 to 20 in the interest of clearness.

In Figs. 21 to 28 inclusive another embodiment of the invention is disclosed which provides a simplified arrangement, more particularly applicable to the wrapping of substantially rigid articles.

Referring to Fig. 21 the articles are advanced by a constantly driven infeed pusher conveyor 225, and associated with a wrapper *w* engaged over the leading face and the upper and lower faces of the article, as previously described and as shown at the left of Fig. 21. Conveyor 225 advances the articles over a table 226. A constantly operating gripper conveyor 227 operates over the table 226. As best shown in Fig. 22, conveyor 227 comprises three chains 228, 229 and 230 which are trained around spaced sprockets 231, 232 and 233, respectively, one set of sprockets being shown in Figs. 21 and 22, fixed to a shaft 234. The chains are supported along their upper runs by an upper casing member 235 secured between side casing members 236 having inturned flanges 237, the chains 228 and 230 being supported along their lower runs by the lower flanges 237.

Rear gripper members 240 are adjustably secured to angle plates 241 which are secured to links of center chain 229 by brackets 242. Members 240 carry angle members 243 which are positioned to extend over the upper face of the article and are provided with sponge rubber pads 244. Forward gripper members 246 are secured to angle plates 247 which are secured to links of the outside chains 228 and 230 by brackets 248. Members 246 are provided with sponge rubber pads 249 against which the articles are pressed by members 240 when an article is engaged between the grippers as shown in Fig. 21. As indicated in Fig. 22 sprockets 231 and 233 which carry chains 228 and 230, to which grippers 246 are secured, are splined to shaft 234, while sprocket 232 carrying chain 229 to which grippers 240 are secured is adjustably fixed to shaft 234 to facilitate adjustment of the grippers to articles of different size.

As the articles and their wrappers are discharged by conveyor 225 they are engaged and carried forward by the grippers 240 and 246, the rear gripper folding a portion of the wrapper against the rear face of the article leaving a trailing wrapper edge portion *b* as in the previously described forms.

Table 226 is formed with an opening 250 over which the articles are carried by the grippers. As the articles move over the opening 250 first the wrapper portion *d*, including the edge portion *c*, which is to be lapped over the portion *b*, is freed to swing downwardly as shown in Fig. 21 to clear the adjacent face of the article. On further advance of the article portion *b* is freed from the table and swings downwardly as shown in Fig. 23.

Positioned below opening 250 is a shaft 251 which is constantly driven in timed relation with conveyors 225 and 227 by a chain 252 passing around a sprocket 253 fixed to shaft 251 over a sprocket 254 fixed to shaft 255 of conveyor 225 around an idler sprocket 256 and in engagement with a sprocket 257 fixed to shaft 234 of conveyor 227.

Fixed to shaft 251 is a constantly rotating lapping mechanism 258, which comprises spaced parallel bars 259 fixed to shaft 251 and connected at their opposite ends by blades 260 and 261. Bars 259 are of a length such that blades 260 and 261 substantially tangentially engage the articles through the opening 250, and the driving connection above described is such that blades 260 and 261 have a surface speed three times the linear speed of conveyor 227, the grippers being so spaced on conveyor 227 that successive articles are operated on by the successive blades 260 and 261.

Shaft 251 carries spaced hubs 262 to which are secured U-shaped members 263 and 264 including respective transverse rods 265 and 266 which respectively lead the blades 260 and 261. Shaft 251 also carries spaced hubs 267 to which are secured U-shaped members 268 and 269 including respective transverse rods 270 and 271 which respectively lead the rods 265 and 266. The rods 265—266—270—271 are positioned at a slightly less radius from the center of shaft 251 than the blades 260—261.

As the article and lapping members advance to the position of Fig. 23 rod 270 enters behind wrapper portions *c—d* and on further advance, as in Fig. 24, rod 265 engages wrapper portion *b*, while rod 270 carries portion *c—d* forwardly. In Fig. 25 rod 270 has passed beyond portion *c—d* and the advance of the article has carried the forward wrapper portion *d* onto table 226 beyond opening 250 while bar 265 which has passed beyond portion *b* now engages portion *c* holding the latter away from the article as blade 260 starts the folding of portion *b* against the under face of the article. With the further advance shown in Fig. 26 rod 265 releases portion *c* permitting it to swing back beneath blade 260 which is completing the folding of portion *b* against the article.

In Fig. 27, with further advance of the articles and lapping instrumentalities, the leading edge of blade 260 has engaged portion *c* while folded portion *b*, still held in place by the blade is engaged between the leading portion *c* and the article, and in Fig. 28 the edge of portion *c* which has been snubbed around the edge of plate 226 by the blade is about to be released therefrom, for completion of the lapping of edges *b* and *c* as shown at the right of Fig. 21, preparatory to folding of the extending end portions of the wrapper as previously described.

While the lapping mechanisms have in each case been shown as operating on the underside of the article, it will be understood that the parts might be reversed to operate on the upper face of the article if desired.

What is claimed is:

1. In a wrapping machine, means to continuously advance an article to be wrapped and means to encircle the continuously advancing article with a wrapper comprising means to engage the leading face of the article with a portion of the wrapper intermediate its ends, means to lay one end portion of the wrapper against one adjacent face of the article, and means to successively lay intermediate portions of the other end portion of the wrapper respectively against the other adjacent face of the article and the trailing end face of the article with the end thereof extending from said trailing end face, means to free the first mentioned end portion in part at least from the adjacent face of the article and means to insert the said extending end of said other end portion between said first adjacent face and said first end portion of the wrapper.

2. In a wrapping machine, means to continuously advance an article to be wrapped and means to encircle the continuously advancing article with a wrapper comprising means to engage the leading face of the article with a portion of the wrapper intermediate its ends, means to lay one end portion of the wrapper against one adjacent face of the article, means to successively lay intermediate portions of the remaining portion of the wrapper respectively against the other adjacent face and the trailing face of the article, with the end portion trailing the article,

means to clear the first-mentioned end portion, in part at least from the adjacent face of the article and means to fold the said trailing end portion of the wrapper against that face of the article from which said first-mentioned end portion has been cleared.

3. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; means carried by the article advancing means to fold a portion of the trailing end of the wrapper against the trailing face of the article with the edge portion thereof trailing the article, means to temporarily clear the first-mentioned wrapper end portion, in part at least, from the adjacent face of the article, means traveling at a speed in excess of the article to fold said trailing edge portion against that face of the article from which said first-mentioned end portion has been cleared and means to fold said cleared end portion in lapping relation over the so-folded trailing edge portion to complete the encirclement of the article by the wrapper.

4. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; said article advancing means including a conveyor having means engaging the trailing portion of the wrapper to fold a portion thereof against the trailing face of the article with the end portion thereof trailing the article, means, moving with said conveyor through a portion of the path of movement of the article, to clear the first-mentioned wrapper end portion, in part at least, from the adjacent face of the article, folding means traveling at a speed in excess of the article to fold said trailing end portion against that face of the article from which said first end portion has been cleared and means to fold said cleared end portion in lapping relation over the so-folded edge portion as the article is advanced from said folding means.

5. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; a table member over which the article and wrapper are advanced with the first-mentioned end portion of the wrapper between the article and said table member, said article advancing means including a conveyor having means engaging the trailing portion of the wrapper to fold a portion thereof against the trailing face of the article, with the end portion thereof trailing the article as the article and its wrapper advance over said table member, a second table member spaced forwardly of the first table member, folding means positioned between said table members and movable in the direction of article advance to fold the trailing end portion of the wrapper against the adjacent face of the article and means leading said folding means to clear the first end portion of the wrapper from said adjacent face of the article in advance of the folding of the trailing end portion thereagainst by said folding means.

6. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; a table member over which the article and wrapper are advanced with the first-mentioned end portion of the wrapper between the article and said table member, said

article advancing means including a conveyor having means engaging the trailing portion of the wrapper to fold a portion thereof against the trailing face of the article, with the end portion thereof trailing the article, as the article and its wrapper advance over said table member, a second table member spaced forwardly of the first table member, means positioned between said table members for lapping the end portions of the wrapper on the adjacent face of the article as the latter travels over said space, said lapping means comprising suction means engaging said first-mentioned wrapper end portion, means to advance said suction means in the direction of article travel and to simultaneously swing said suction means away from the article to swing the said first-mentioned wrapper end portion clear of the article, a folding blade trailing said suction means, means to advance said blade at a speed in excess of that of the article and said suction means to fold the trailing end portion of the wrapper against the adjacent face of the article while the first-mentioned wrapper end portion is clear thereof, the edge of said second table member forming means to overlap the first wrapper end portion on said folded trailing end portion as the article is advanced onto said second table member.

7. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; a table member over which the article and wrapper are advanced with the first-mentioned end portion of the wrapper between the article and said table member, said article advancing means including a conveyor having means engaging the trailing portion of the wrapper to fold a portion thereof against the trailing face of the article, with the end portion thereof trailing the article, as the article and its wrapper advance over said table member, a second table member spaced forwardly of the first table member, means positioned between said table members for lapping the end portions of the wrapper on the adjacent face of the article as the latter travels over said space, said lapping means comprising a pair of carriages reciprocable between and in the plane of said table members, a suction member hinged to the leading carriage and a folding blade carried by the following carriage, respective means to reciprocate the carriages to position them adjacent the first table member with said suction member in the plane thereof as an article and its wrapper is advanced therefrom and onto said suction member and to thereafter advance the leading carriage at substantially the speed of advance of the article, means to simultaneously swing said suction means away from the article to swing the first-mentioned wrapped end portion clear of the article, the said means reciprocating the trailing carriage initially advancing the folding blade at a speed less than that of the article and suction member to open a gap between the blade and suction member to receive the trailing wrapper end portion and to thereafter advance the blade at a speed in excess of that of the article and suction member to fold the trailing wrapper end portion against the adjacent face of the article while the first-mentioned wrapper end portion is clear thereof, and means to swing said suction member and the edge of the second table member forming means to overlap the first wrapper end portion on the folded trailing end portion as said carriages reach for forward limit of their reciprocation and the article is advanced onto said second table member.

8. A wrapping machine as in claim 7 including means carried by said following carriage to apply adhesive to the inner face of the first-mentioned wrapper end portion while the latter is held clear of the article by said suction means.

9. A wrapping machine as in claim 7, said suction mem-



ber having an extent sufficient to initially engage the trailing end portion of the wrapper and positively draw it into the path of the folding blade as the suction member swings the first-mentioned wrapper end portion clear of the article.

10. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; a table member over which the article and wrapper are advanced with the first-mentioned end portion of the wrapper between the article and said table member, said article advancing means including means engaging the trailing portion of the wrapper to fold a portion thereof against the trailing face of the article, with the end portion thereof trailing the article, as the article and its wrapper advance over said table member, a second table member spaced forwardly of the first table member, means positioned between said table members for lapping the end portions of the wrapper on the adjacent face of the article as the latter travels over said space, said lapping means comprising a plurality of lapping instrumentalities, means for continuously moving said instrumentalities in a closed path to successively present said instrumentalities respectively to successive articles as the latter are advanced over said space by the constantly operating article advancing means, each of said instrumentalities including a folding blade engaging said trailing end portion of the wrapper as the latter clears said first table to fold said trailing end portion against the adjacent forwardly extending face of the article, and means leading said folding blade and engageable with the first-mentioned wrapper end portion to clear the latter from said face in advance of the engagement of the trailing end portion of the wrapper by said folding blade.

11. A wrapping machine as in claim 10, said lapping instrumentalities being carried by a conveyor traveling at a speed substantially equal to the speed of advance of the articles, said folding blades being pivotally mounted on said conveyor and cam means to pivot said blade in the direction of article advance to effect the said folding of the trailing end portion of the wrapper when the first-mentioned wrapper end portion has been cleared from the adjacent face of the article.

12. In a wrapping machine as in claim 11, the means for clearing the first-mentioned wrapper end portion from the adjacent face of the article comprising a suction member pivotally mounted on said conveyor, and cam means to swing said suction members to and from the plane of said table members as the said suction members travel between the table members.

13. In a wrapping machine having means to continuously advance an article in a straight line path and means in the path of such advance to fold a wrapper about the leading and two adjacent faces of the article with one end portion of the wrapper engaging one of said adjacent faces and the other end portion of the wrapper trailing the article; a table member over which the article and wrapper are advanced with the first-mentioned end

portion of the wrapper between the article and said table member, said article advancing means including means engaging the trailing portion of the wrapper to fold a portion thereof against the trailing face of the article, with the end portion thereof trailing the article, as the article and its wrapper advance over said table member, a second table member spaced forwardly of the first table member, means positioned between said table members for lapping the end portions of the wrapper on the adjacent face of the article as the latter travels over said space, said lapping means comprising a plurality of folding blades carried by a constantly rotating shaft and respectively engaging the trailing wrapper end portions of successive articles to fold said portion against the adjacent forwardly extending face of the article, and means carried by said shaft and leading the folding blades to engage and clear the first-mentioned wrapper end portions from said face in advance of the folding of the trailing end portions by the blades.

14. In a wrapping machine as in claim 13, the folding blades being two in number and arranged diametrically opposite each other with respect to the shaft by which they are carried, and means to rotate said shaft at a speed to impart a surface speed to the blades substantially three times that of the articles.

15. In a wrapping machine as in claim 13, the means for clearing the first-mentioned wrapper end portion from the adjacent face of the article comprising a rod spaced from and parallel to the folding blade.

16. In a wrapping machine, means for encircling articles in wrappers, said means comprising means for partially encircling each article, means for continuously advancing such partially encircled article with one end of the wrapper lying against one face of the article and the other end trailing therebehind, a first member having a surface along which said one face is advanced after being partially encircled, a second member spaced from said first member in the direction of article movement to provide an opening through which the wrapper ends extend as the article is further advanced, spaced transverse members movable through a path intersecting the path of movement of the wrapper ends extending through said opening, and means for so moving said transverse members in the same direction as and at a faster rate than the article and in such predetermined timed relation to the movement of the article that one of said transverse members holds said one wrapper end clear of said one article face as a following transverse member lays said other wrapper end against said one article face, continued movement of the article bringing said one face into engagement with said second member with said one wrapper end overlying said other wrapper end.

17. In a wrapping machine, means for encircling articles in wrappers as set forth in claim 16 wherein said spaced movable members rotate about a fixed center.

References Cited in the file of this patent

UNITED STATES PATENTS

60	2,385,706	Jensen	Sept. 25, 1945
	2,592,283	Hohl	Apr. 8, 1952