Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

Filed Nov. 26, 1930 9 Sheets-Sheet 1

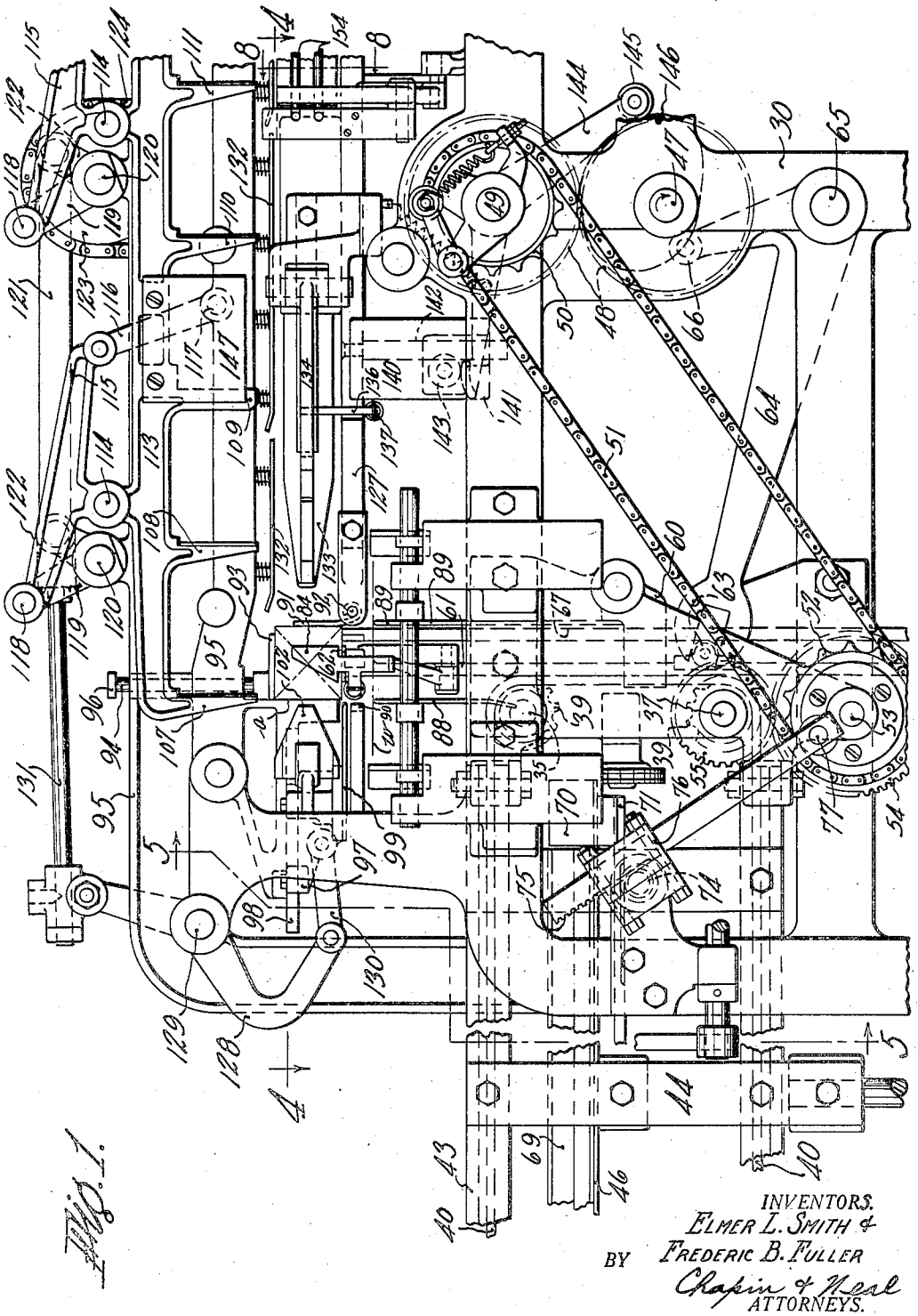


Fig. 1.

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WRAPPING MACHINE

Filed Nov. 26, 1930 9 Sheets-Sheet 2

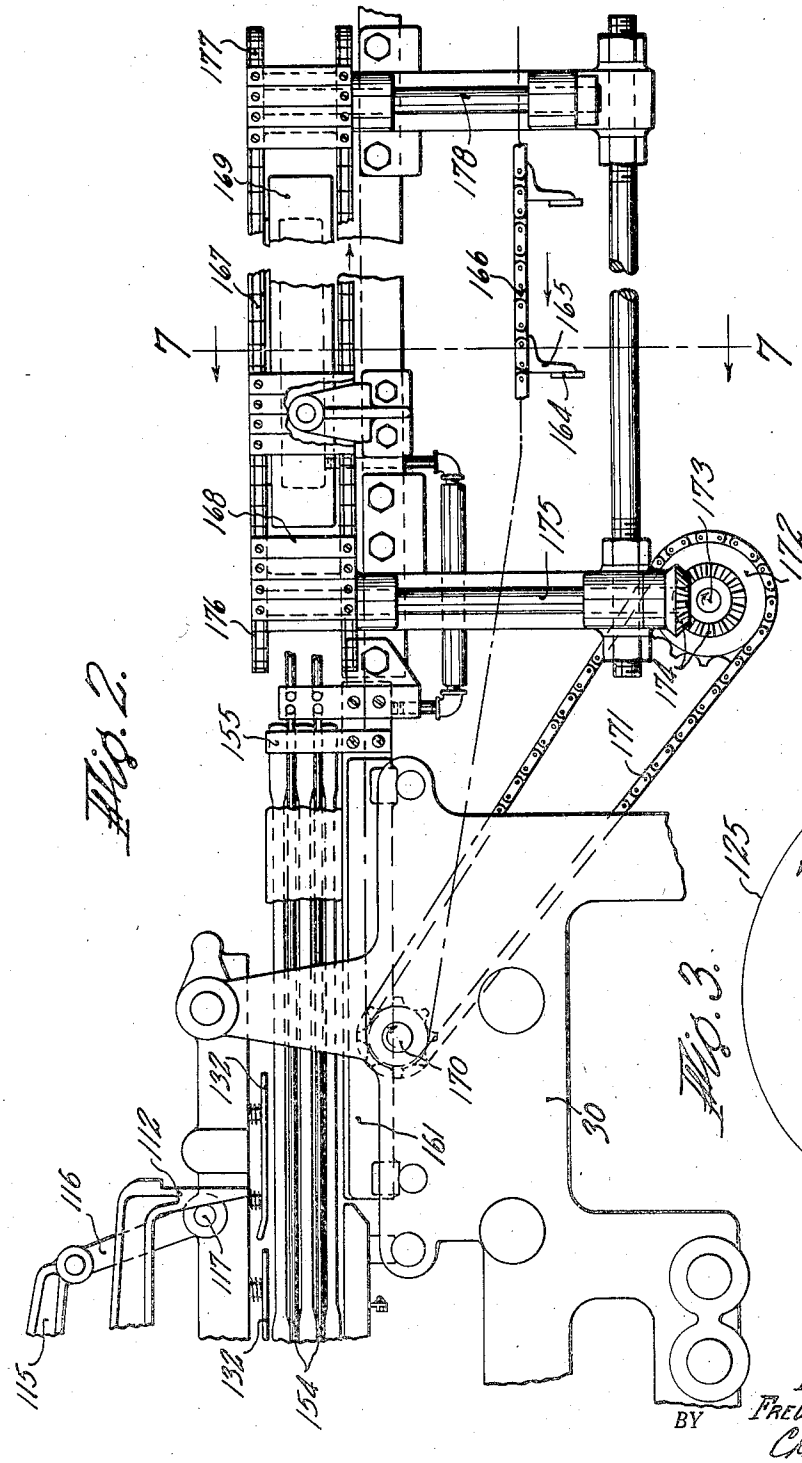


Fig. 2.

Fig. 3.

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Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

Filed Nov. 26, 1930 9 Sheets-Sheet 3

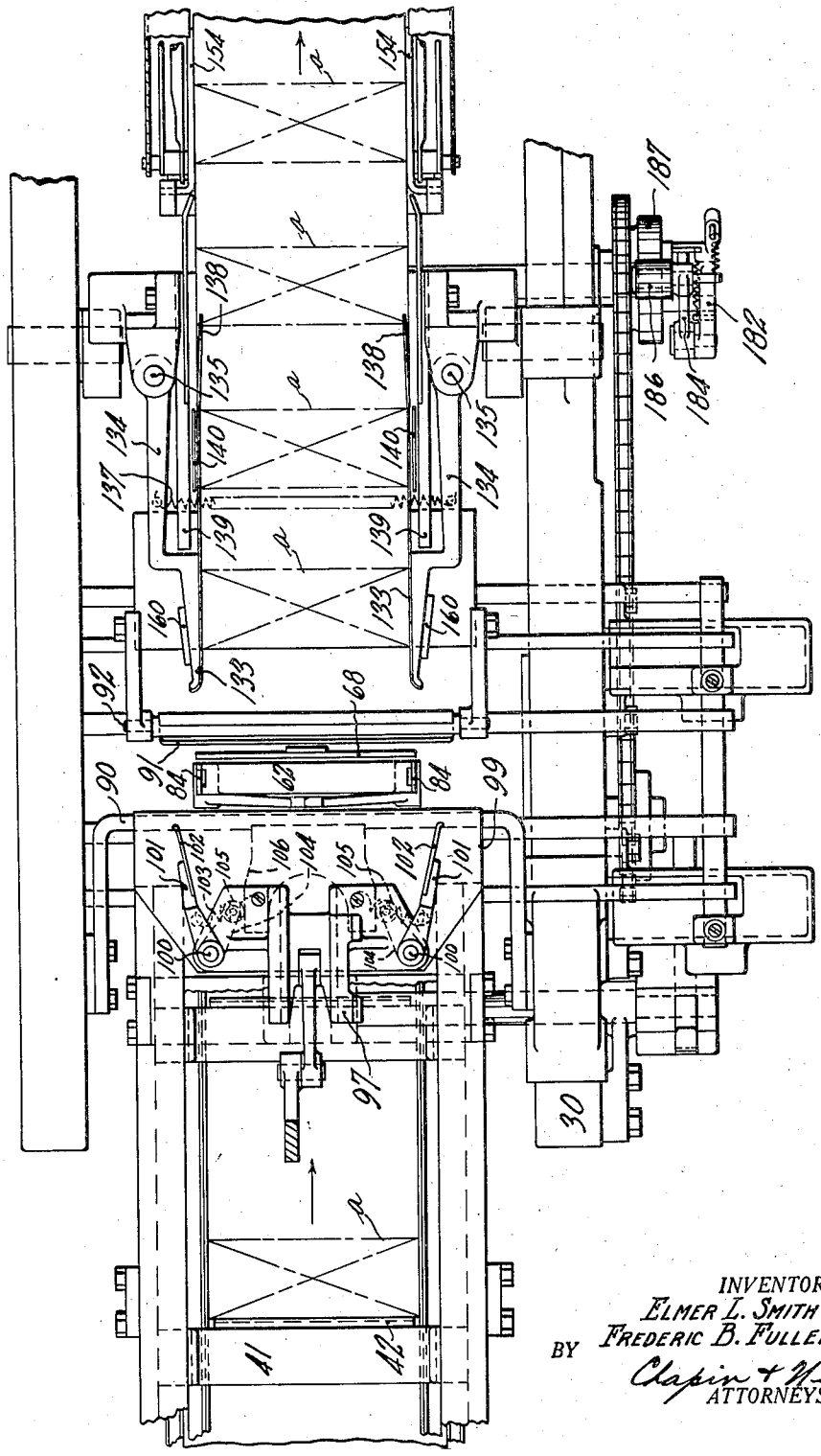


Fig. 4.

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Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

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Fig. 5.

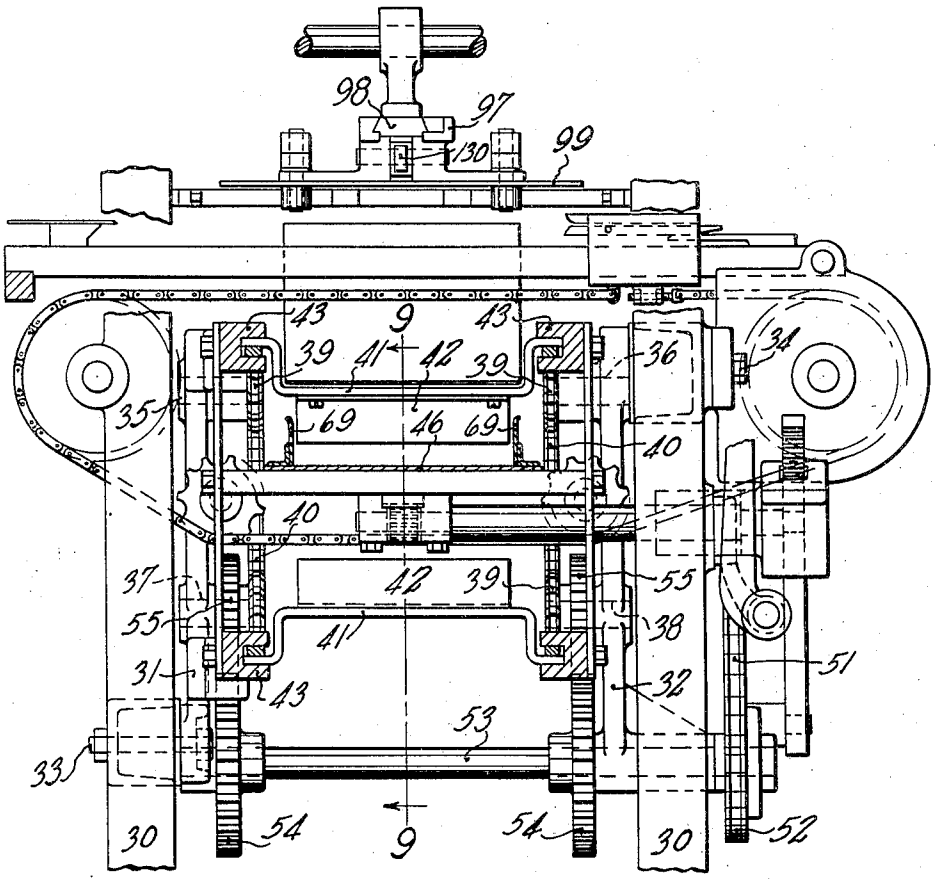
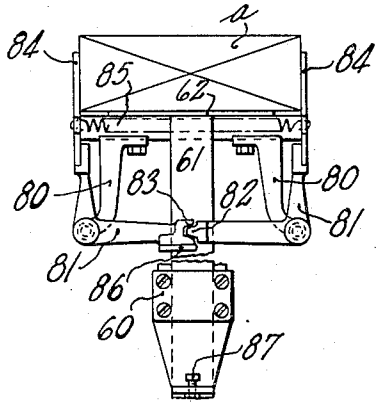


Fig. 6.



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Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

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Fig. 7.

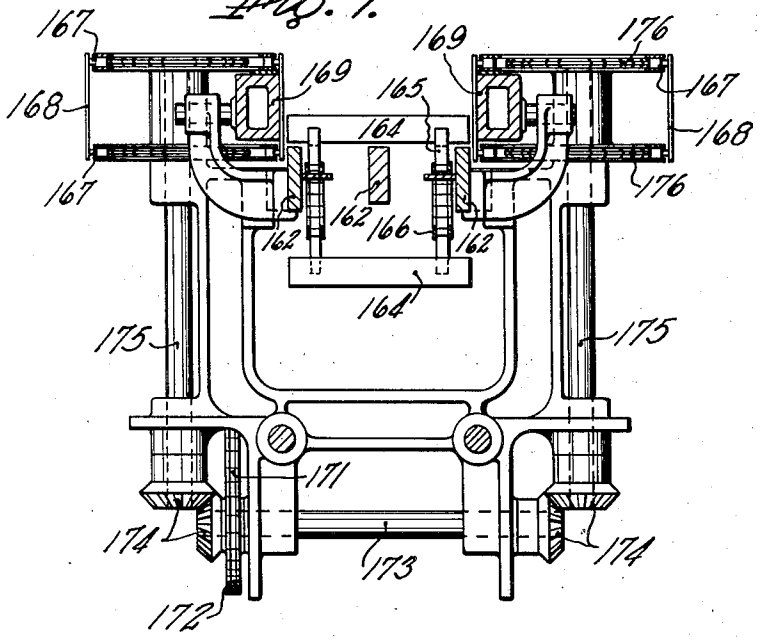
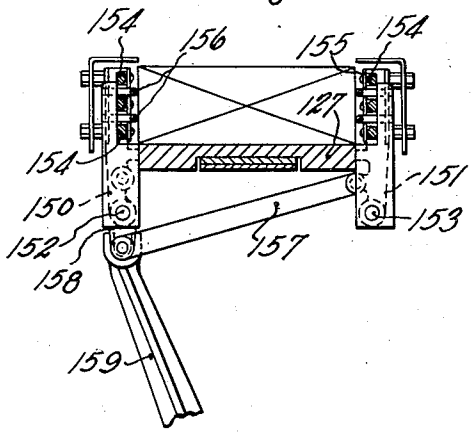


Fig. 8.



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WRAPPING MACHINE

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Fig. 9.

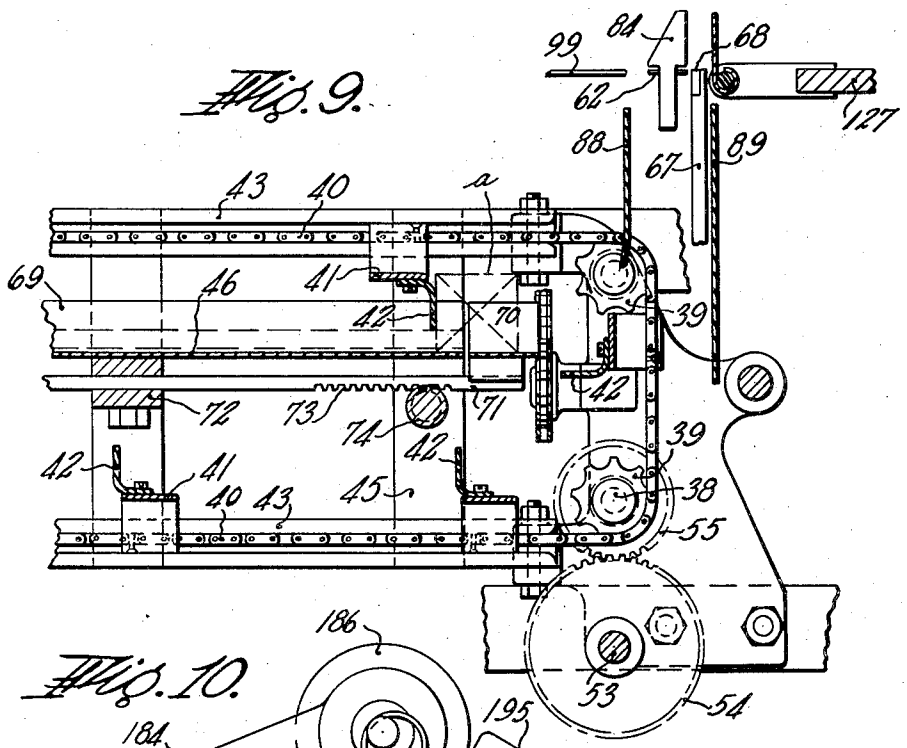
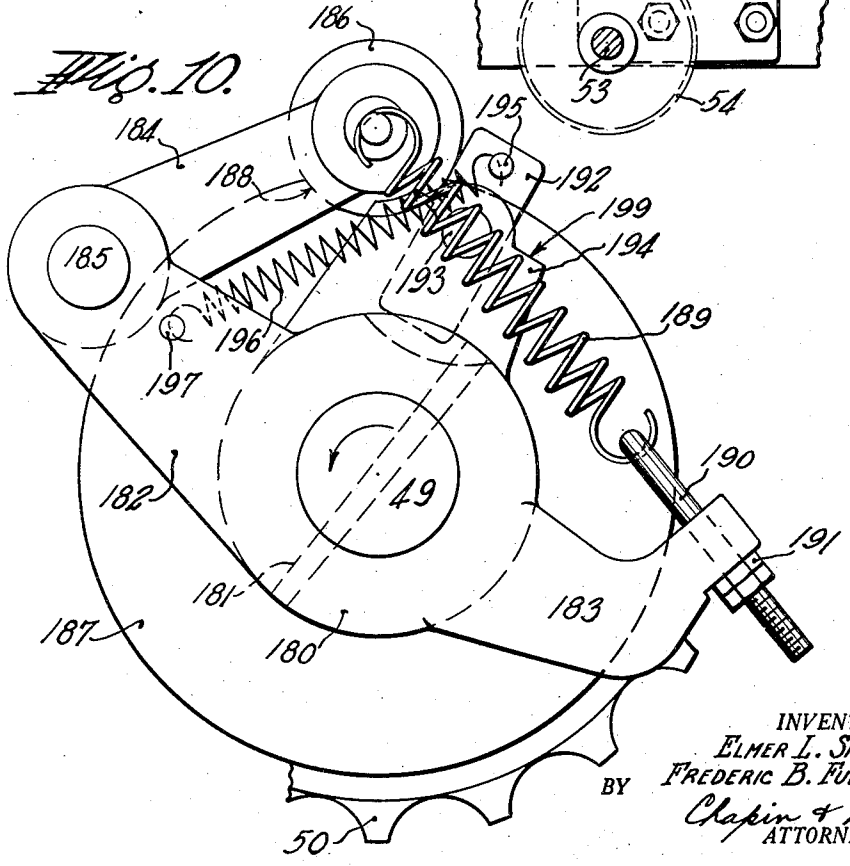


Fig. 10.



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Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

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Fig. 11.

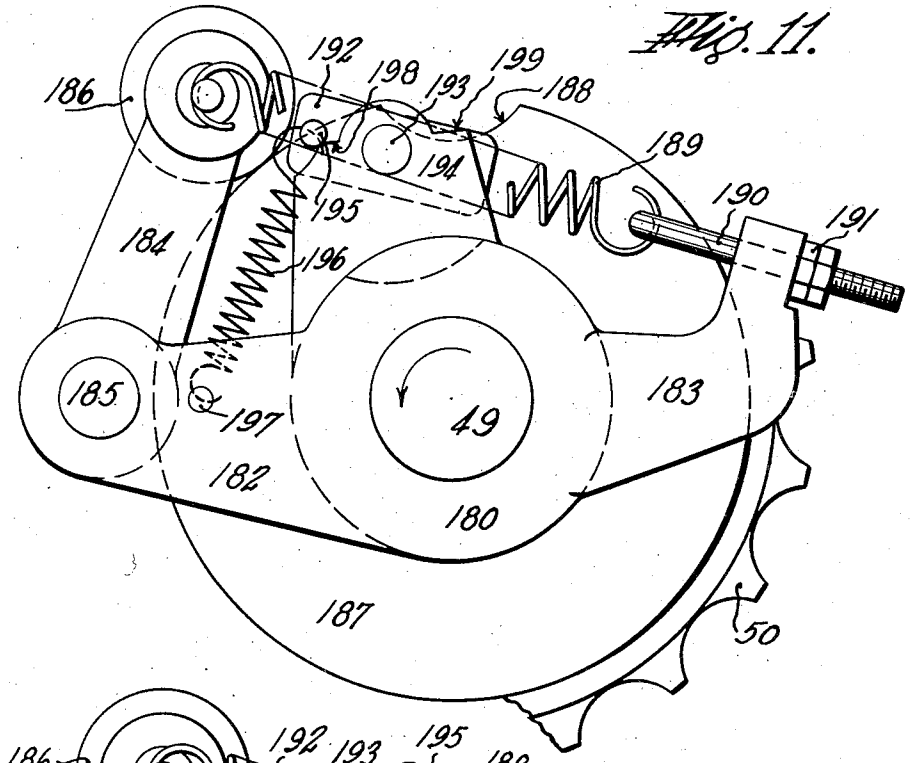
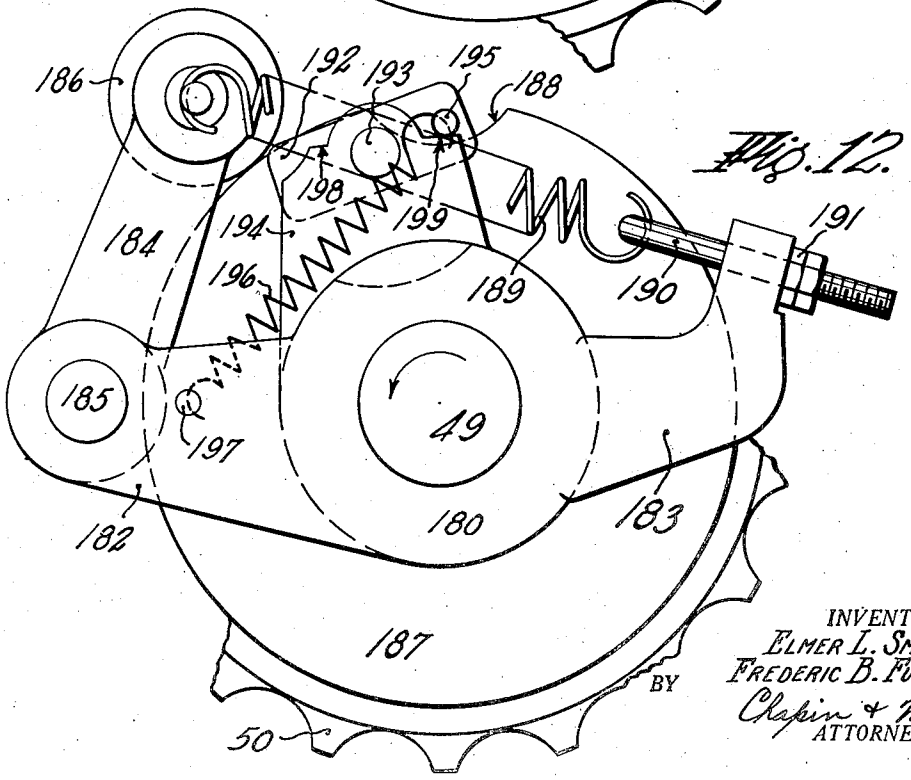


Fig. 12.



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Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

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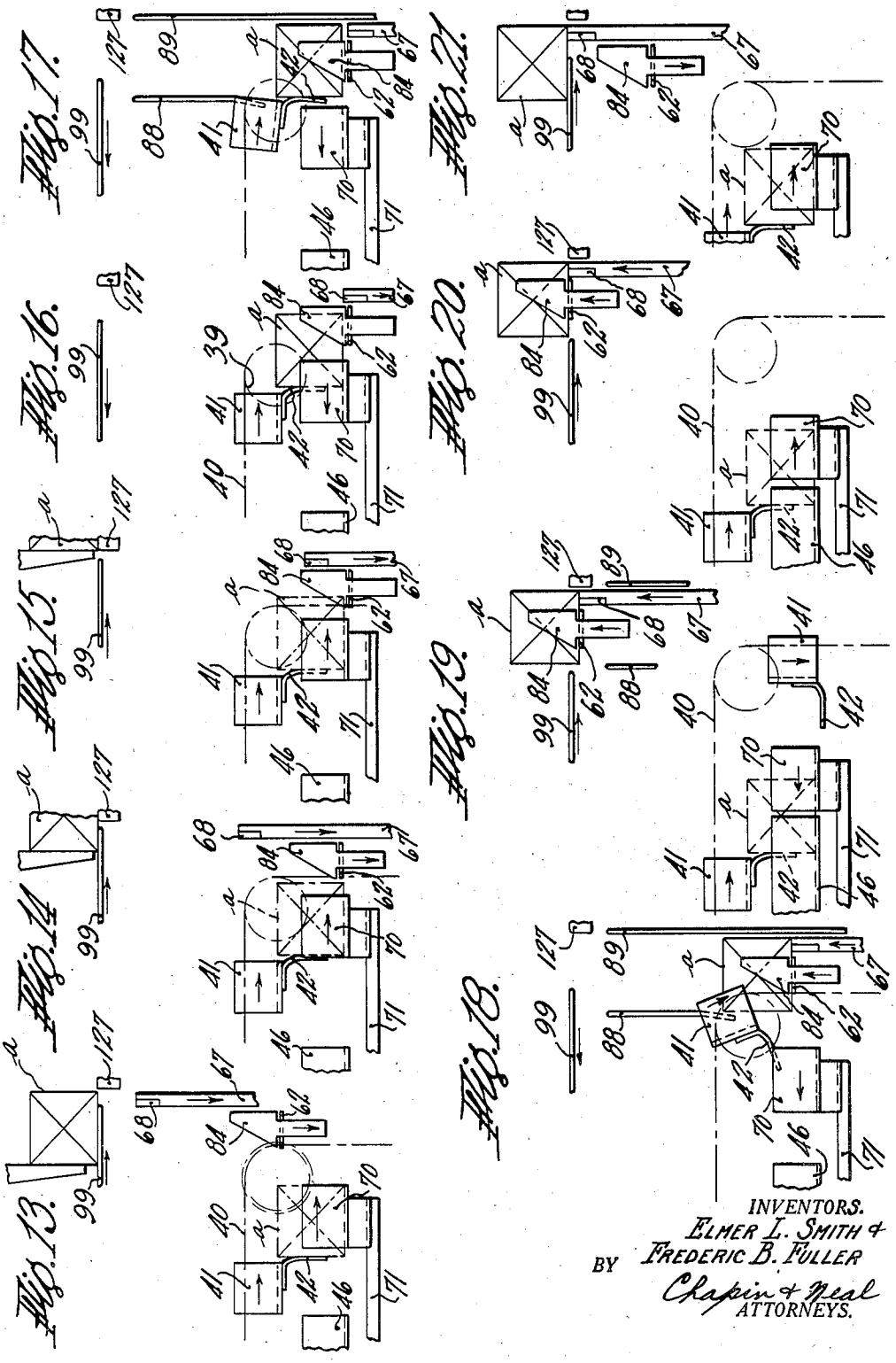


Fig. 17.

Fig. 16.

Fig. 15.

Fig. 14.

Fig. 13.

Fig. 20.

Fig. 19.

Fig. 18.

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Nov. 21, 1933. E. L. SMITH ET AL 1,936,462

WRAPPING MACHINE

Filed Nov. 26, 1930 9 Sheets-Sheet 9

Fig. 26.

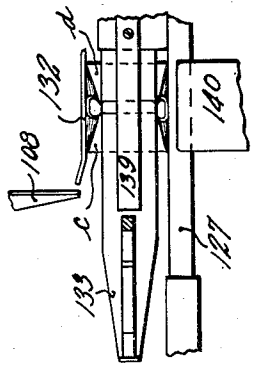


Fig. 29.

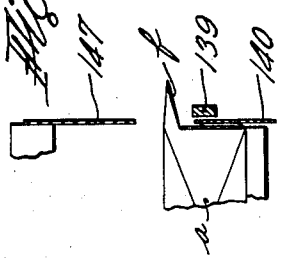


Fig. 33.

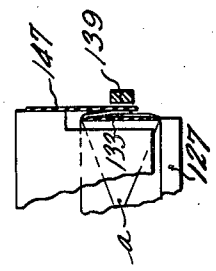


Fig. 25.

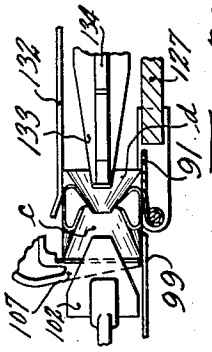


Fig. 28.

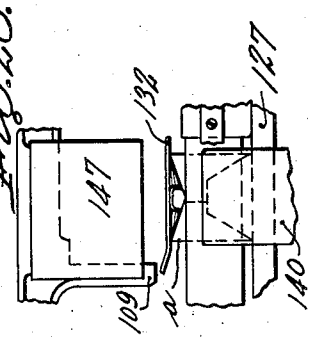


Fig. 32.

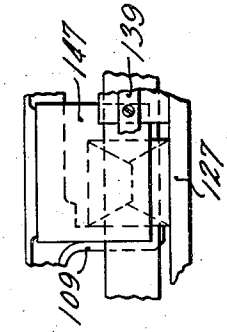


Fig. 23.

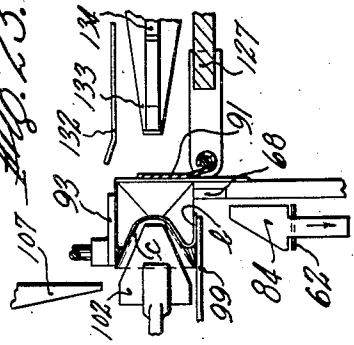


Fig. 27.

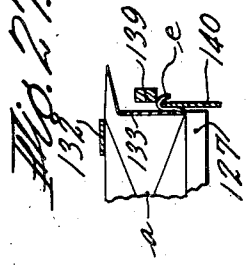


Fig. 31.

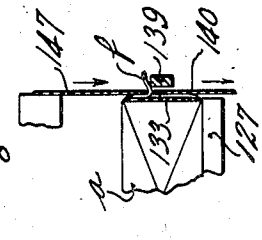


Fig. 22.

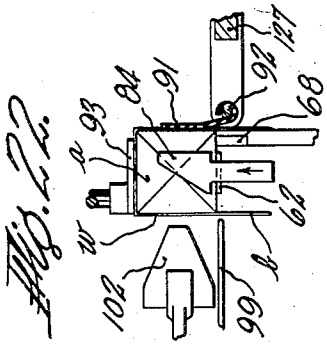


Fig. 24.

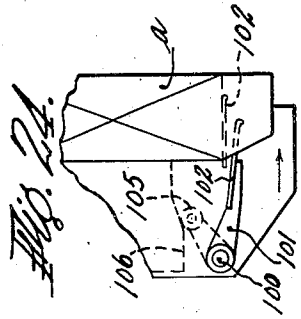
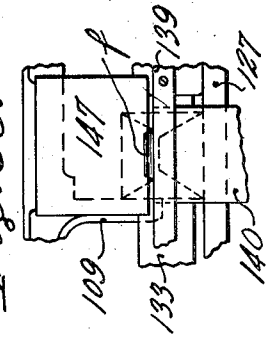


Fig. 30.



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Patented Nov. 21, 1933

1,936,462

UNITED STATES PATENT OFFICE

1,936,462

WRAPPING MACHINE

Elmer L. Smith, Longmeadow, and Frederic B. Fuller, Springfield, Mass., assignors to Package Machinery Company, Springfield, Mass., a corporation of Massachusetts

Application November 26, 1930. Serial No. 498,490

15 Claims. (Cl. 93—2)

This invention relates to wrapping machines, particularly to that type represented in our prior Patent No. 1,575,723, March 9, 1926, in which an article is received upon an elevating plunger which first carries it and a sheet of wrapping material between folders which drape the wrapper around the article in U-form, and then leaves the partially wrapped article at the entrance to a wrapping channel through which it is moved to complete the wrapping operation. It is the object of the present invention to improve upon this type of machine in several particulars, some of which are applicable to machines of different types. In one aspect the present machine includes improved mechanism for placing the articles upon the elevating plunger. In another aspect the machine includes mechanism particularly adaptable for handling stacks of delicate articles such as crackers. In another aspect the machine includes improved heat sealing mechanism for the packages. Other particulars in which the present machine differs from those previously proposed will appear from the following description and claims.

The invention will now be described in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of the wrapping end of a machine embodying the invention;

Fig. 2 is a continuation of Fig. 1, showing the sealing and delivery end of the machine;

Fig. 3 is a diagram indicating the path traveled by the transporter elements;

Fig. 4 is a top plan sectional view of the end of the machine shown in Fig. 1, taken on line 4—4 of Fig. 1;

Fig. 5 is a transverse section taken on line 5—5 of Fig. 1;

Fig. 6 is a detail of the elevating plunger and the centering devices associated with it;

Fig. 7 is a section on line 7—7 of Fig. 2;

Fig. 8 is a section on line 8—8 of Fig. 1;

Fig. 9 is a section on line 9—9 of Fig. 5;

Fig. 10 is a detail of an overload protective device, shown in its normal running position;

Fig. 11 is a similar view showing the device in the position it occupies when tripped by an overload condition of the mechanism;

Fig. 12 is a similar view showing the device in its reset position;

Figs. 13 to 21, inclusive, are diagrammatic views showing different stages in the delivery of an article by the feeding conveyor to the elevating plunger and by that plunger to the first wrapping position;

Fig. 22 is a diagram showing the first wrapping step;

Figs. 23 and 24 are respectively side and top plan diagrammatic views showing the formation of the bottom rear fold and rear end tucks;

Figs. 25 and 26 are side views illustrating the formation of the bottom front fold and the front end tucks;

Fig. 27 is a transverse section showing an intermediate stage in the folding of the bottom end flaps;

Figs. 28 and 29 are respectively side and transverse sectional views showing the completion of the folding of the bottom end flaps;

Figs. 30 and 31 are respectively side and transverse sectional views showing an intermediate stage in the folding of the top end flaps; and

Figs. 32 and 33 are similar views showing the completion of the folding of those flaps.

The machine is mounted on a main frame which may be formed in sections but is indicated generically at 30. At the feed end there are a pair of supplementary frames 31 and 32 (Fig. 5) attached to the main frame at 33 and 34 respectively. Journaled in these supplementary frames are a pair of opposite stub shafts 35 and 36, and below them a second pair 37 and 38. On each of these stub shafts is mounted a sprocket 39 around which pass two parallel chains 40 which carry spaced hangers 41 bridging the chains and bearing push plates 42. The hangers hold the push plates at all times within the circuit traveled by the chains (Figs. 5 and 9) with the article engaging surfaces of the pushers entirely below a horizontal line passing through the centers of sprockets 39 when the chains are passing along their upper run. The plates describe a path of motion which can be considered best after a description of certain further article-handling devices. During their horizontal travel the chains are received in guides 43 which at one end are attached to the supplementary frames 31, 32 and at their other end and along their length are carried by floor brackets 44 (Fig. 1) so that the feed conveyor can be extended away from the machine. It will be understood that idle sprockets are mounted at the far end of the guides, although space does not permit their being shown in the drawings. Also carried on the floor brackets 44 and suitable intermediate framework 45 is an article guideway 46 along which the articles *a* are pushed by the plates 42.

The chains are driven continuously, although they place the articles successively upon an ele-

vating plunger which reciprocates vertically. Such a reciprocating plunger has in prior constructions required an intermittent article-feeding mechanism. The continuous drive for the chain is obtained from a constantly rotating drive shaft 47 (Fig. 1) which is coupled by equal gears 48 with a jack shaft 49. Rotatable upon this shaft but normally coupled to it by a safety release mechanism to be described is a sprocket 50 joined by a chain 51 with a sprocket 52 mounted on a shaft 53. The latter shaft is journaled in the supplementary frames 31, 32, and carries a pair of gears 54 meshing with gears 55 on the stub shafts 37, 38 (see also Fig. 5).

Positioned directly ahead of the article guideway and the conveyor is a vertically reciprocating elevator which receives the articles from the conveyor and carries them upwardly through a horizontally placed wrapping sheet into a position directly in front of a horizontal folding channel. Slidable vertically in fixed guides 60 (Figs. 1 and 6) is a bar 61 having an elevator platform 62. A roll 63 is secured to the bar and runs in the slotted end of a bell crank lever 64 pivoted at 65 to the frame. On the other end of the lever a cam roll 66 coacts with a cam mounted on the main drive shaft 47. Also running in the guides 60 is a second elevator bar 67 carrying a narrow platform 68 at its top (see also Figs. 18 and 19). The operating mechanism for this bar is similar to that for bar 61, but is not illustrated since it lies directly back of the lever 64 in Fig. 1. By the cam mechanisms described, the elevator platforms are moved periodically from a lower position in line with the article feedway to an upper position in line with the wrapping channel. The relative movement of the two platforms can be considered best at a later time.

The article guideway 46 has side plates 69 (Fig. 5) which can be adjusted to the width of the article or article stack. A channel shaped extension 70 (Fig. 9) of the guideway is secured to a rod 71 slidable in guides 72, so as to be movable from the position of Figs. 9 and 19 to that of Fig. 15. This channel section forms a movable bridge or shuttle connecting the article guideway and the elevators, and cooperates with the push plates 42 in causing the articles to be deposited in succession upon the elevators without interrupting the continuous travel of the conveyor chains 40. A rack 73 (Fig. 9), formed on the bottom of the rod 71, meshes with gear teeth cut in a transverse shaft 74. A rack bar 75 (Fig. 1) also meshes with gear teeth cut on this shaft, being held in contact by a guide 76 swung on the shaft. At its other end the rack bar is pivoted to a crank pin 77 on the sprocket 52.

The operation of the mechanism for placing the articles in succession on the elevators will now be considered with particular reference to Figs. 13 to 21. The lower part of Fig. 19 shows an article *a* being transferred from the article guideway 46 to the shuttle 70. At about this instant the shuttle starts moving, although not as fast as the continuously moving pushers 42. The article is thus constantly traveling across the shuttle, as seen in Figs. 20, 21, 13 and 14. At the latter position the elevator 62 has just about reached its lowermost position, and in Fig. 15 the pusher 42 is carrying the article over the now stationary shuttle onto the elevator. The second elevator 68 lags behind the first in order to give support to a preceding article at the wrapping channel, but reaches a level with elevator 62 in time to permit the article to be completely positioned as shown in Figs. 16 and 17. Preferably the second elevator descends somewhat below the first, as shown in Fig. 17, so that the leading edge of the package will be sure not to strike upon it.

Just as the article is completely positioned upon the elevator, the hanger 41 which supports the push plate starts to pass around the bend in the chain where it turns around the sprocket 39. The push plate first tilts away from the article, as in Fig. 17, and finally clears it altogether as in Fig. 18. Due to the fact that the hangers are bent in U-form (Figs. 5 and 9), the push plates travel well inside the chain path at all times and execute a novel and useful movement in passing around the upper bent in the chain. The plates move horizontally up to the position of Fig. 17 with constant speed. While their carrying chains continue their uninterrupted motion the plates suddenly cease moving forwardly and actually draw away from the article in a horizontal direction. This is clearly shown from a comparison of Figs. 17 and 18. Further downward motion of the push plates continues without any interference with the article which now (Fig. 18) starts to rise into the wrapping mechanism. As soon as the article is transferred to the elevator, the shuttle 70 moves back, avoiding interference with the descending push plate 42 and getting into position to receive a succeeding article. The chains 40 are of course spaced apart wider than the articles, so that the articles can travel between the vertical runs of the chains; whereas the push plates 42 are made relatively narrow, so that they will pass between the sides 69 of the guideway and between the sides of the U-shaped shuttle 70.

The present machine has been designed especially for use in wrapping stacks of crackers, although it will find utility in other connections. These stacks require support on their ends during their travel upon the elevating platform. An end holding device has accordingly been provided, which serves the additional purpose of centering the stack as it is introduced into the wrapping mechanism. This device is illustrated in Figs. 1 and 6 and is carried by the main elevator plate 62. A pair of brackets 80 (Fig. 6) are secured to the lower side of the plate, and have pivoted to them a pair of oppositely facing bell cranks 81. At their meeting ends one crank has a projection 82 and the other a notch 83 to receive it, while their upright portions carry article engaging plates 84, one at each end of the elevator platform. A spring 85 keeps the plates constantly urged together. At the lower end of the travel of the elevator a pad 86 on one of the bell cranks strikes a stationary abutment 87 so that the bell cranks are rocked and the plates 84 are moved away from the ends of the platform. This permits the transfer of the article stack to a position between the plates while the latter are held open, the plates closing and taking control of the stack when the elevator starts to rise.

During the rise on the elevator the article is guided by plates 88 and 89 (Fig. 1) which define a vertical chute at the top of which the paper sheet *w* is fed by mechanism not necessary to describe here. The sheet is folded down along the rear side of the article by a stationary abutment 90 shown as formed of a horizontal U-shaped strap secured to the frame (Fig. 4). The forward down fold is made by a plate 91 pivoted at 92 and arranged to be held normally in the vertical position of Figs. 1 and 9 by a spiral spring surrounding

the pivot. This plate is yieldable, as shown in Fig. 25, to permit the partially wrapped package to pass along the folding chute.

As the package passes the folders 90 and 91 with the paper draped in inverted U-form around it, it encounters a presser plate 93 which rests by gravity upon it. The plate is carried upon a rod 94 vertically reciprocable in a portion 95 of the main frame which passes down through the center of the machine. A collar 96 upon the top of the rod prevents it from dropping down more than the distance desired. The partially wrapped package is now in the position shown in Fig. 22. To the rear of the package a slide 97 (Figs. 1 and 5) is horizontally reciprocable in ways 98 formed on the frame. A folding blade 99 is carried on the bottom of this slide, positioned to pass under the article and lay down the bottom rear fold *b* (Figs. 22 and 23). As the slide is advanced by mechanism to be described, the elevator 62 drops, permitting support of the rear edge of the article to be assumed by the blade. The elevator 68 remains in its elevated position longer than the elevator 62 (Fig. 23) to give support to the front edge of the article until the article is well held by the blade. The elevator 68 also coacts with the presser 93 to prevent premature advance of the package.

Also carried by the slide 97 are a pair of vertical shafts 100 (Fig. 4) to which are attached arms 101 bearing end folding blades 102. Each arm 101 is joined to a pin on the slide by a spring 103, so that the blades are given a constant tendency to approach each other. Arms 104 are also secured to the shafts 100, and carry at their ends rolls 105 coacting with the inclined edges of a cam 106 secured to the machine frame. In their rearward position of Figs. 4 and 22 these blades are tilted outwardly, but as the slide advances they gradually approach each other as indicated in Fig. 24, finally reaching the position indicated by 102' where they are held snugly against the package ends by their springs. These blades both take over the control of the stack of articles formerly held by the blades 84 and also make the rear end tucks *c* in the paper.

The articles are successively advanced along the wrapping channel by a pair of sets of pushers 107, 108, 109, 110, 111, and 112 (Figs. 1 and 2), one set being positioned on each side of the central frame 95. Each set of pushers is carried on a frame 113 joined by shafts 114 with rockers 115. One end of each rocker is joined to a link 116 pivoted to the central frame at 117, and the other end is pivoted at 118 to a crank 119 mounted on a shaft 120. A connecting rod 121 joins two cranks 122 on the shafts 120 so that the shafts are constrained for rotation in unison. One of the shafts 120 has a sprocket 123 driven by a chain 124 from a sprocket (not shown) on the shaft 49. As the shafts 120 are thus given a continuous rotation the ends of the pushers are caused to travel through a path whose shape is indicated at 125 in Fig. 3. This figure also shows a line 126 indicating the upper side of the bottom plate 127 of the wrapping channel, the pushers passing by the sides of this plate. The motion of the transporter is also used to reciprocate the slide 97 which carries the rear end tuckers. A lever 128 is pivoted at 129 to the frame, and is joined to the slide by a link 130 and to the nearest arm 122 by a link 131.

The manner in which the folds are completed during the travel of the article along the table 127 will now be considered. The mechanism which is provided for this purpose has various features of novelty, particularly in the matter of securing neat and tight end folds without subjecting the ends of the package to damaging strain. This is of particular importance where articles such as stacks of soda crackers, easily injured by compression, are being wrapped As the articles are moved from the elevator by the pusher finger 107 they are brought under spring pressed top plates 132 (Fig. 1) and between the tapering tucking plates 133. The latter plates form the end tucks *d* opposite the tucks *c* previously made, as shown in Fig. 25. The tucking plates are of novel design and arrangement, being secured at their forward tapering ends to opposed arms 134 (Fig. 4) and trailing unsupported against the package ends except for this anchorage. The arms 134 are pivoted to the frame at 135 and are fitted with pins 136 (Fig. 1) joined together by a spring 137 so that the plates will exert a light but yielding pressure upon the package ends. For the same purpose the rear ends 138 (Fig. 4) of the tucking plates 133 are bent inwardly so that they will always be under a slight tension. It will be observed that the pivot 135 is located some distance away from the front end of the plates, and that the rear ends 138 of the plates terminate in the neighborhood of the pivot. The front or tucking ends of the plates are thus permitted to move apart or together according to the length of package fed between them without exerting any substantial effect on the pressure exerted by the rear ends of the plates upon packages which have passed further along the wrapping channel.

The article carried by pusher 107 is left as shown in Fig. 4 just between the plates 133. The pusher 108 next engages it and moves it to the position of Fig. 26, where it is engaged by the top and bottom end folders. Both the top and the bottom end folders are arranged to cooperate with a stationary bar 139 around which the arms 134 are bent, as shown in Fig. 4. The lower folders 140 act first. These are in the form of plates secured upon a carrier 141 (Fig. 1) extending across under the plate 127 and reciprocable vertically on guides 142. A roll 143 mounted on the carrier is acted upon by one end of an angle lever 144 pivoted on the shaft 49. The other end of the lever carries a cam roll 145 resting upon a cam 146 fixed to the shaft 47. The cam causes the bottom folders to rise once during each cycle of the machine and to coact with the top folders in the manner to be described.

As the bottom folders start to rise, they tuck the lower end flaps *e* between the plate 133 and the stationary bar 139 (Fig. 27). The plate 133 imparts an artificial rigidity and flatness to the end of the article, and the bar 139 exerts a drag on the flap so that the wrapper is tightly drawn around the lower corner of the article. The combined action of these parts also serves to iron down the folds at the edges of the triangular flaps *e*. While the bottom folders 140 are in their elevated position, the upper folding plates 147 descend. These plates are secured to the transporter beams 113 adjacent the pushers 109. During the downward movement of the beams the plates are brought downwardly in substantially the same plane as the bottom folders 140, and drag the upper flaps *f* in between the plates 133 and the bars 139. The lower folders have passed upwardly completely over the lower flaps *e*, and start to go down just in advance of the upper folders as shown in Figs. 30 and 31. Complete descent of the upper folders folds the flap *f* down over the plates 133 on top of the flaps *e*

as shown in Figs. 32 and 33, by which time the pusher 109 has entered upon its forward movement, carrying the completely wrapped package away from this wrapping station.

It is generally preferred to wrap articles of this character in wax paper and to seal the wrapped package by heat. On account of the irregular shape of the faces of the crackers and their fragile character, certain refinements of the usual heating devices have been produced which differ in their operation from the heat sealing devices usually employed.

The methods of heating wax impregnated folds which have hitherto been proposed rely upon contact of heated plate with the wax paper. We have found that superior results are obtained by the use of infra-red radiation, or radiant heat. According to this novel method of heating, the heating elements are spaced from the folds, which may be held if necessary by some means such as spaced rails not interfering with the transfer of heat radiation. It is found that the transfer of heat to the inner folds of the paper is much more complete than where contact is relied on and that complete fusion of the wax can be obtained even where the surface of the article being wrapped is irregular.

The main end heating devices are carried upon a pair of rocking frames 150 and 151 (Fig. 8) pivoted at 152 and 153 to the frame. Each of the frames carries a series of heating elements 154, preferably of the commercial type encased in a metal sheath, secured in position by clips 155. The heaters are never in contact with the package ends, but are spaced from them by rods 156. These rods, of which in the illustrated case there are two on each side located between the heaters, bear directly on the ends of the packages and serve to hold the flaps closed and to locate the packages centrally between the heaters. The wax paper in the folded ends of the packages is heated in this manner by radiant heat rather than by heat conducted through metal plates as is the general practice. By so doing, the distribution of heat to the irregular package ends is made much more uniform, no dependence being placed on pressure contact for the transfer of heat.

It is preferable to remove the heating devices from the package ends when the machine is stopped in order to avoid overheating the packages. For this purpose, the rocking frames 150, 151 are connected by a link 157 so that they will move simultaneously in opposite directions. An extension 158 on the frame 150 has a pin and slot connection with a rocking lever 159 which may be operated manually in an independent manner or may be interconnected with the machine clutch control as may be desired.

The lower plate 127 of the wrapping channel is also preferably heated, as by an enclosed electric resistance to fuse the wax in the bottom overlapping plies. It is also preferred to supply the arms 134 with heating elements 160, preferably electrical, to transfer heat to the plates 133. While no actual sealing is done by these plates, the heat supplied to them prevents the wax in the paper from sticking to them, as it frequently does with cold folding plates.

After the wax in the folded package ends has been fused, it is necessary to cool it while the folds are held against opening up. In the present case, the bottom of the package merely slides over a chilled plate, but the ends are held between metal plates carried by conveyor chains in such a way as to form a continuous wall engaging and moving with the package on one side and traveling over a cooling box on the other. The cooling plate for the bottom of the package is indicated at 161 (Fig. 2) and is preferably located within the zone where the package ends are being warmed by the heaters 154. This leaves the sealed bottoms of the packages free so that they may pass through the end chilling devices while supported on parallel bars 162 (Fig. 7). Pushers 164, carried by lugs 165 on chains 166 (Figs. 2 and 7) carry the packages continuously through the cooling zone. Moving at the same speed as chains 166, but at right angles to them, are opposite pairs of chains 167 joined by plates 168. As they pass adjacent the path of the articles, the plates pass over and in contact with smooth surfaced hollow members 169 through which water may be circulated to keep them cool. A metallic contact is thus maintained without slip against the ends of the article, and the metallic contacting surfaces are kept cold at all times. The chains 166 are driven from sprockets on a shaft 170 (Fig. 2) having a chain connection 171 with a sprocket 172 on a cross shaft 173. Bevel gears 174 at each end of the shaft 173 connect it with vertical shafts 175 upon which are mounted the sprockets 176 upon which the chains 167 run. Similar idle sprockets 177 upon vertical shafts 178 support the other ends of the chains 167. The delivery pusher chains 166 are preferably extended over a delivery table which has not been illustrated, and the sprockets which support the far ends of these chains accordingly do not appear on the drawings.

It is desirable to provide some mechanism for stopping the machine when it becomes overloaded, as from an article stack becoming misplaced and jamming. The preferred device for this purpose is illustrated in Figs. 10, 11 and 12, and has the advantages of requiring only a slight additional load above normal to cause the machine to be stopped, being readily adjustable, and remaining automatically in disconnecting position until reset manually by the operator. A sleeve 180 is pinned at 181 to the shaft 49 and bears a pair of arms 182 and 183. A lever 184 is pivoted at 185 to the arm 182 and carries at its end a roll 186 riding on the surface of a disk 187 secured to the sprocket 50. This sprocket, as stated previously, is free on the shaft. In the periphery of the disk is a notch 188 curved to fit the roll 186 and into which the roll is normally pulled by a spring 189. The end of this spring is secured to a ring bolt 190 adjustably secured by nuts 191 to the arm 183. By varying the tension on the spring, the pressure with which the roll is drawn into the notch can be varied. The contact between the roll and the notch is all that holds the shaft 49 and the sprocket 50 together, so that whenever the strain on the mechanism driven by the sprocket exceeds a predetermined value the roll will ride up out of the notch and will thereafter travel freely around the surface of the disk 187.

Mechanism is provided to prevent the roll settling again into the notch when the shaft has made a complete revolution, and thus to force the operator to correct the improper condition. A short bar 192 is pivoted at 193 to an extension 194 of the sleeve 180. The bar thus travels with the roll 186 at all times, with its pivot 193 in constant angular relation to the pivot 185 around which the roll swings. At one end the bar car-

ries a pin 195 joined by a spring 196 with a pin 197 on the arm 182. The extension 194 is formed with shoulders 198 and 199 against which the pin 195 may rest, the relation of the pin 197 to the pivot 193 being such that the spring 196 crosses that pivot as the bar is swung from one extreme position to the other, holding the bar yieldingly in either position.

Fig. 10 shows the device in the position it occupies during use. The roll 186 is seated in the notch 188, and until some undue strain is imposed on the machine the sleeve 180 and the disk 187 will rotate as a unit. If an article becomes jammed in the machine, the load will become great enough to permit the roll 186 to ride out of the notch onto the outer surface of the disk, as shown in Fig. 11. This draws the roll far enough away from the pivot 193 to permit the bar 192, which up to that time has been riding against the edge of the roll as in Fig. 10, to slip under the roll with the pin 195 drawn against the shoulder 198 as in Fig. 11. During the bulk of the rotation of the sleeve the roll will pass over the surface of the disk and the bar will have no effect. When, however, the roll passes over the notch, it will rest against the end of the bar, which receives the thrust in approximately the line of its pivot. The roll is thus prevented from sinking into the notch, and the rotation of sleeve 180 will continue without effect on the disk until the bar 192 is manually reset.

For the resetting operation, it is generally preferable to stop the rotation of sleeve 180. After the defective package has been removed, the bar 192 is swung to the position of Fig. 12 and the rotation of the shaft is restarted. While the roll 186 is traveling around the surface of the disk, this changed position of the bar is without effect; but when the roll reaches the notch it is now permitted to drop into it without interference from the bar. The disk 187 and the mechanism driven by it will thus be started again. At the same time the roll 186 will press down the end of the bar which is under it in Fig. 12 sufficiently to cause the spring to pass to the other side of the pivot 193 and to cause the bar to reassume the position of Fig. 10 in which its side is held by the spring 196 against the roll. The disconnection of the overload release mechanism, as described, preferably affects only the article feeding mechanism, as well as the paper feed which has not been described. The transporter and the delivery conveyors continue to run in order to clear the machine of any partially wrapped packages.

The operation of the machine will now be summarized briefly. Articles or stacks of articles to be wrapped are placed manually or by any suitable feeding device upon the guideway 46 in position to be engaged by the continuously advancing pushers 42. The articles are advanced in spaced succession by these pushers to the bridge or shuttle 70, which moves with them to furnish temporary support between the end of the guideway and the elevator 62. As soon as the article stack is positioned upon the elevator 62, this, together with the supplementary elevator 68, rises, while the pusher plate passes downwardly between the elevator and the now retracted shuttle 70.

The upward movement of the elevators causes the article to pick up the wrapping sheet and drapes the latter in inverted U-form around the article. The rear bottom fold *b* is made by folder 99 and the rear tucks *c* by the folders 102 while the elevators are successively retracted. As the article is now advanced over the plate 127 by the transporter finger 107, the front bottom fold is made by the plate 91 and the front tuck *d* is made by the plate 133. Control of the package is then assumed by the transporter finger 108 which carries it into position to have its bottom and top end folds *e* and *f* made by the folders 140 and 147 respectively. These folders knife their respective folds between the plates 133 and 139, thus creasing them and drawing them tightly into position. Further movement of the now completely wrapped article brings it first between the radiant heaters 154 and finally between the chilled moving metal plates 168 which carry it out of the machine.

We claim:

1. A wrapping machine comprising a wrapping station, an article guideway spaced from the station, a plunger reciprocable from a position in line with the guideway to said station, a conveyor traveling in a closed path surrounding said guideway, and pushers attached to the conveyor and having their article-contacting faces extending inwardly of said closed path to contact with articles upon the guideway, said pushers passing between the guideway and the plunger after having positioned an article on the plunger.

2. A wrapping machine comprising a wrapping station, an article guideway spaced from the station, a plunger reciprocable from a position in line with the guideway to said station, a shelf reciprocable between the end of the guideway and the plunger, a conveyor traveling in a closed path surrounding said guideway, pushers attached to the conveyor and extending inwardly of said closed path to contact with articles upon the guideway and to pass between the plunger and the shelf after having positioned an article upon the plunger, and mechanism reciprocating the shelf in timed relation to the movement of the pushers to assist in supporting an article as it is being placed on the plunger and then to withdraw from the path of the pushers.

3. A wrapping machine of the type having a horizontal wrapping channel, a horizontal article guideway spaced vertically from the channel, and a vertically reciprocating elevating plunger movable between the end of the guideway and the initial end of the channel, characterized by a device for feeding articles along the guideway and onto the top of the plunger comprising a pair of chains, one at each side of the guideway, sprockets guiding said chains in parallel closed paths having their upper runs above the guideway, their lower runs below the guideway, and a substantially vertical run substantially adjacent the plunger, and pushers supported by the parallel chains and extending inwardly of said paths to contact with articles upon the guideway and to pass downwardly at one side of the elevating plunger after having positioned an article thereon, the article engaging surfaces of the pushers being below the center of the chain supporting sprockets when the chains are passing along their upper runs.

4. A wrapping machine of the type having a horizontal wrapping channel, a horizontal article guideway spaced vertically from the channel, and a vertically reciprocating elevating plunger movable between the end of the guideway and the initial end of the channel, characterized by a device for feeding articles along the guideway and onto the top of the plunger comprising a pair of chains, one at each side of the guideway, con-

tinuously rotating sprockets guiding said chains in parallel closed paths having their upper runs above the guideway, their lower runs below the guideway, and a substantially vertical run substantially adjacent the plunger, pushers supported by the parallel chains and extending inwardly of said paths to contact with articles upon the guideway and to pass downwardly at one side of the elevating plunger after having positioned an article thereon, a shelf reciprocable between the end of the guideway and the lowermost position of the elevating plunger, and mechanism reciprocating the shelf in timed relation to the movement of the pushers to assist in supporting an article as it is being placed on the plunger and then to withdraw from the downward path of the pushers.

5. A wrapping machine comprising devices for partially wrapping an article leaving extending upper and lower end flaps, a bar positioned between the flaps and spaced from the end of the article, and upper and lower folders each reciprocable past the bar to knife a flap thereunder.

6. A wrapping machine comprising devices for partially wrapping an article leaving extending upper and lower end flaps, a thin plate extending past the end of the article between said flaps, a bar spaced from said plate, and upper and lower folders each reciprocable between the plate and the bar to knife a flap between them.

7. A wrapping machine comprising a wrapping channel, means for delivering a partially wrapped article into the channel, opposed movable end folders spaced from the entrance to the channel and a pair of tucking plates positioned adjacent the entrance of the channel and yieldable about axes located substantially adjacent said end folders, said plates having portions extending along the sides of the channel to a point beyond the end folders.

8. A wrapping machine comprising a wrapping channel, means for delivering a partially wrapped article into the channel, a pair of tucking plates positioned adjacent the end of the channel and having thin flexible plate-like extensions extending along the sides of the channel, a pair of stationary bars positioned along the sides of the channel outside of said plate-like extensions, and top and bottom end folders movable between the extensions and the bars to knife extending wrapper folds between them.

9. A wrapping machine comprising devices for partially wrapping an article leaving opposite extending flaps, a pair of opposed movable folders, and mechanism for operating said folders timed to cause one folder first to pass partially across the article to lay one flap down upon it, then to cause the other folder to move partially across the article to initiate the laying down of the second flap, and finally to move both folders simultaneously to complete the laying of the second flap down upon the first without releasing the first flap.

10. A wrapping machine comprising devices for partially wrapping an article leaving opposite extending flaps, a pair of opposed aligned movable folders, and mechanism for operating said folders timed to cause one folder first to pass partially across the article to lay one flap down upon it, then to cause the other folder to move partially across the article into close adjacency with the first folder to initiate the laying down of the second flap, and finally to move both folders simultaneously in closely spaced relation to complete the laying of the second flap down upon the first without releasing the first flap.

11. In a heat sealing device of the type in which the wax-impregnated folds of a wrapped article are first heated to melt the wax and are then held in adhering contact until cool, means for supporting the articles, and a fold heating device spaced from the article and transmitting heat thereto solely by radiation.

12. In a heat sealing device of the type in which the wax-impregnated folds of a wrapped article are first heated to melt the wax and are then held in adhering contact until cool, a source of infra-red radiation spaced from the article, and means interposed between said source and the article for holding the folds closed without substantially blocking the transmission of radiation from the source to the folds.

13. In a heat sealing device of the type in which the wax-impregnated folds of a wrapped article are first heated to melt the wax and are then held in adhering contact until cool, fold holding rails spaced apart at each end of the article, conveying means for moving the articles along the rails, and electrically heated members positioned between the rails at each end of the article but out of contact with the folds, whereby the wax in the folds will be melted by radiant heat.

14. A method of heat sealing packages wrapped in wax-impregnated paper which comprises subjecting the folds to heat supplied solely by infra-red radiation to melt the wax within the folds, and then holding the folds in contact with one another until the melted wax has cooled.

15. In a heat sealing device in which the wax-impregnated folds of a wrapped article are first heated to melt the wax and are then held in adhering contact, a delivery conveyor comprising a pair of opposed pairs of chains, plates extending between the chains of each pair, and hollow members adapted for the circulation of a cooling medium, over which the plates pass to chill them and to hold them in contact with the ends of the packages.

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