No. 656,826. Patented Aug. 28, 1900.

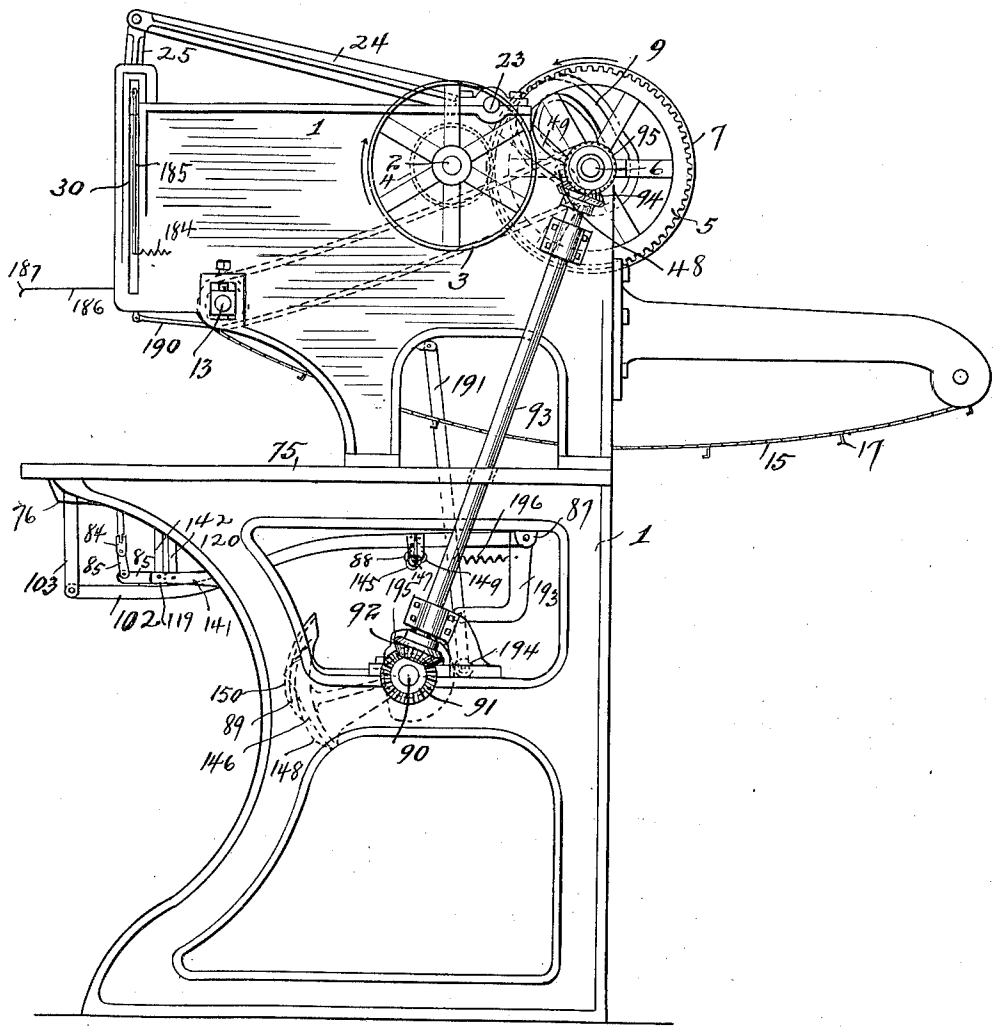
F. M. PETERS.

WRAPPING MACHINE.

(Application filed July 1, 1899.)

(No Model.) 12 Sheets—Sheet 1.

Fig. 1



Witnesses,
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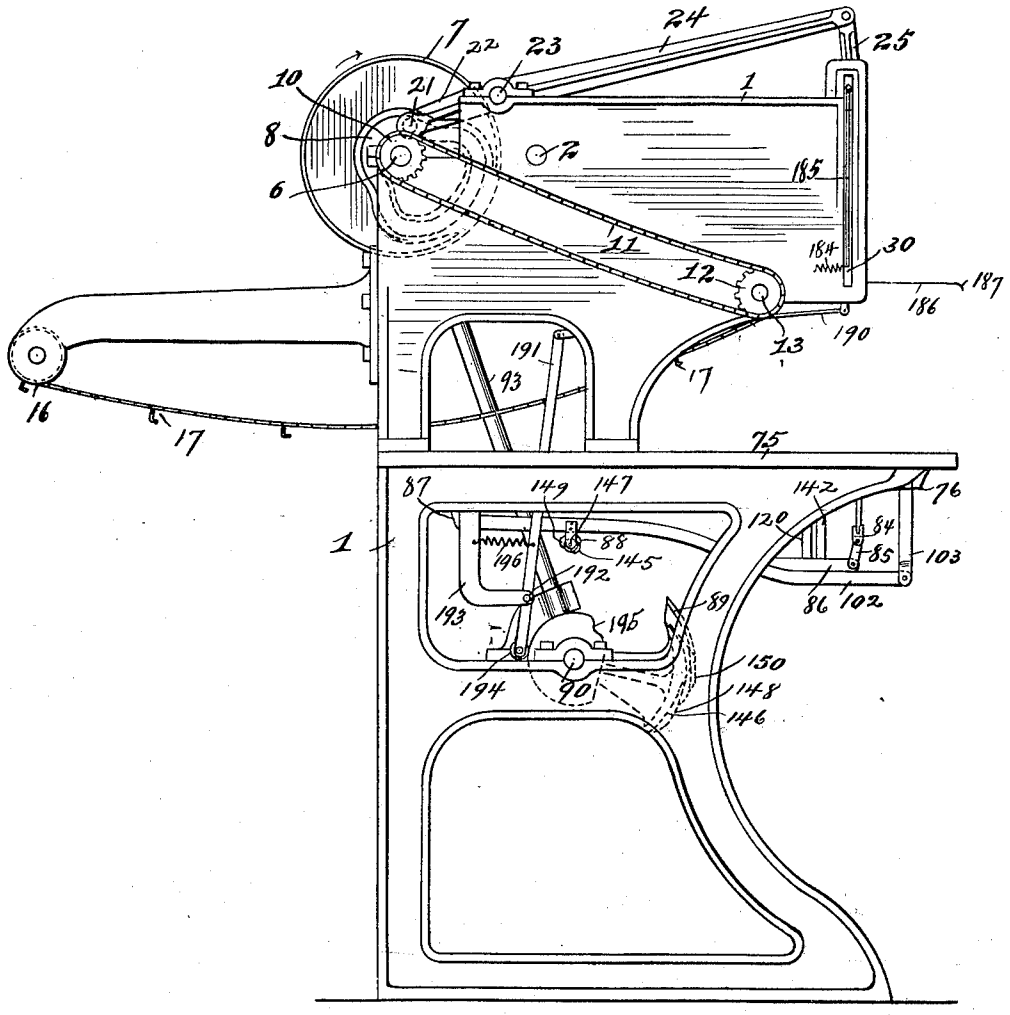
F. M. PETERS.

WRAPPING MACHINE.

(Application filed July 1, 1899.)

(No Model.) 12 Sheets—Sheet 2.

Fig. 2.



Witnesses,
L. D. Mann,
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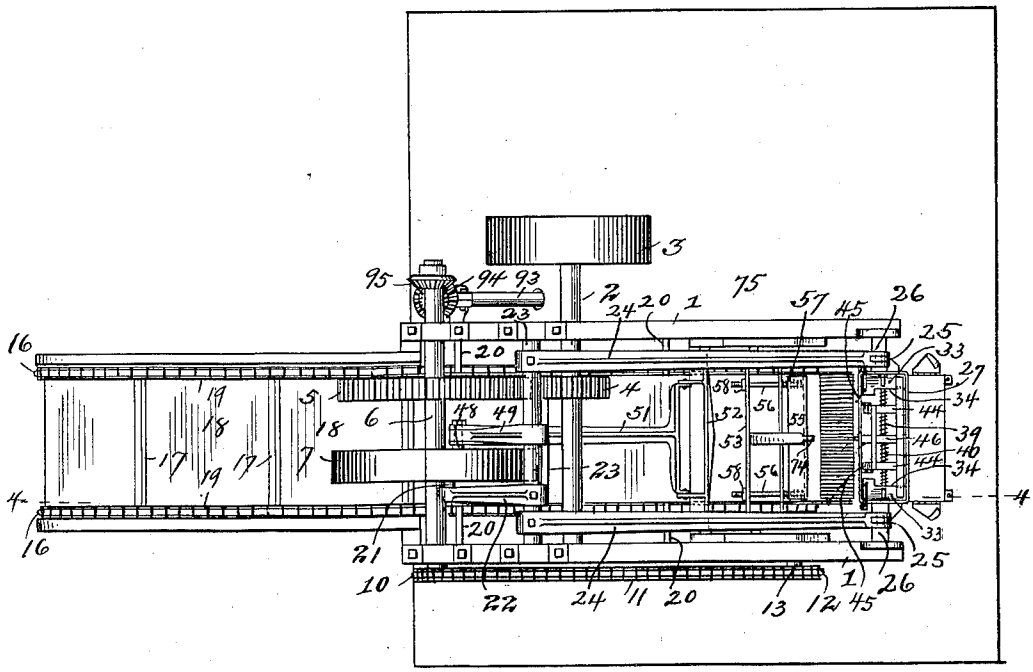
F. M. PETERS.

WRAPPING MACHINE.

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Fig. 3.



Witnesses,
F. D. Mann,
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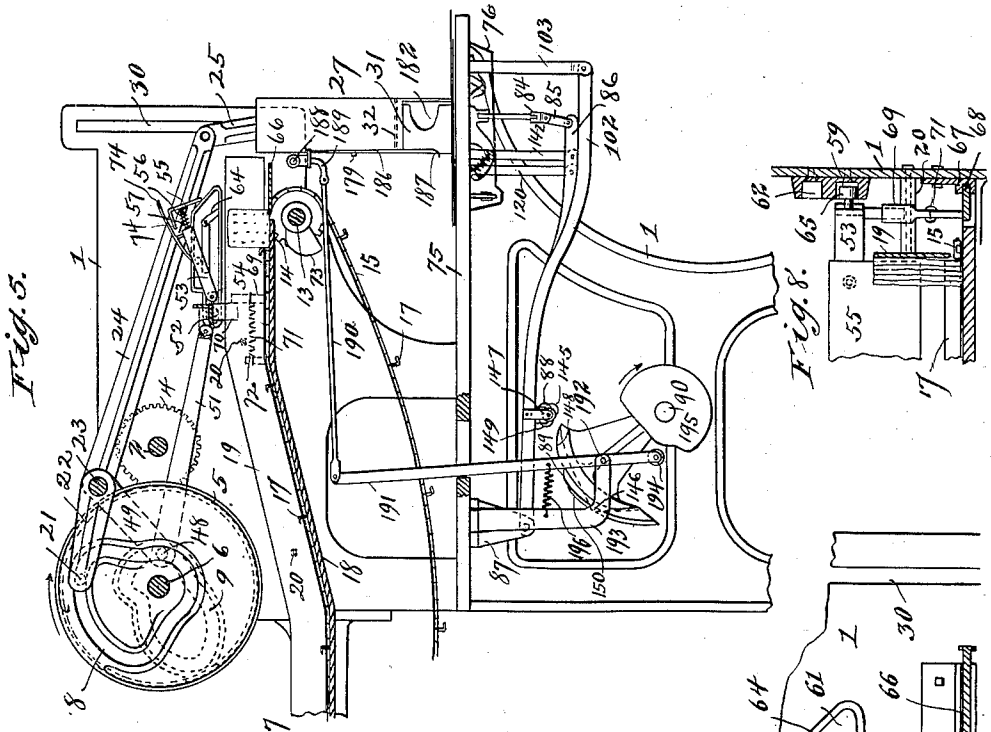


Fig. 5.

Fig. 8.

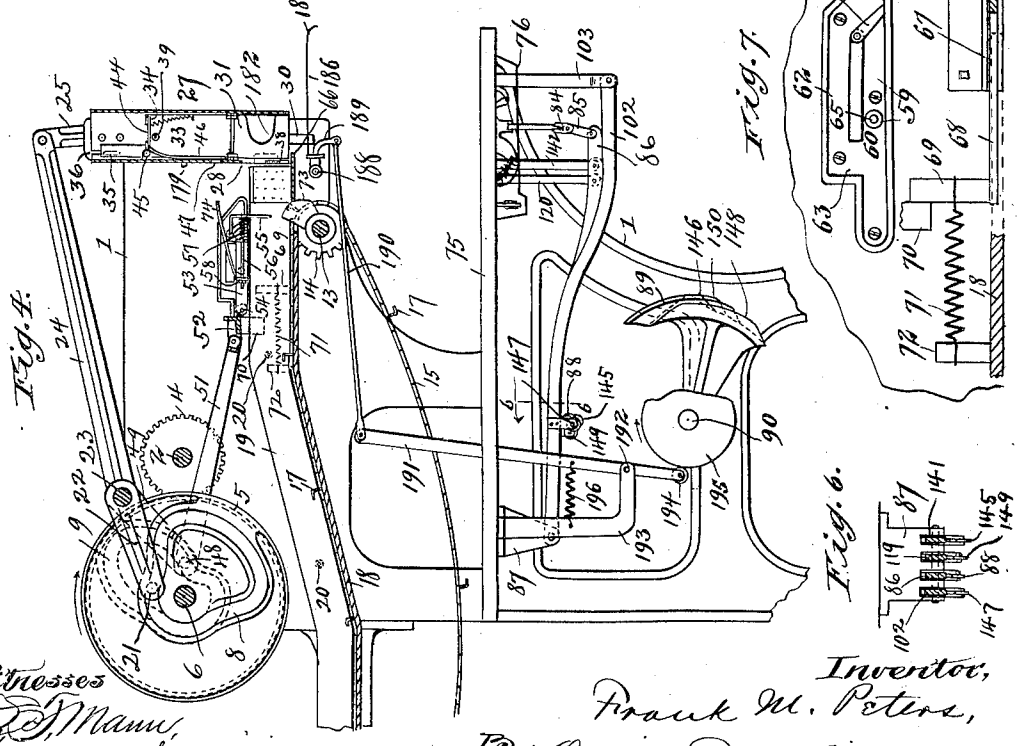


Fig. 4.

Fig. 7.

Fig. 6.

Witnesses
Geo. T. Mann,
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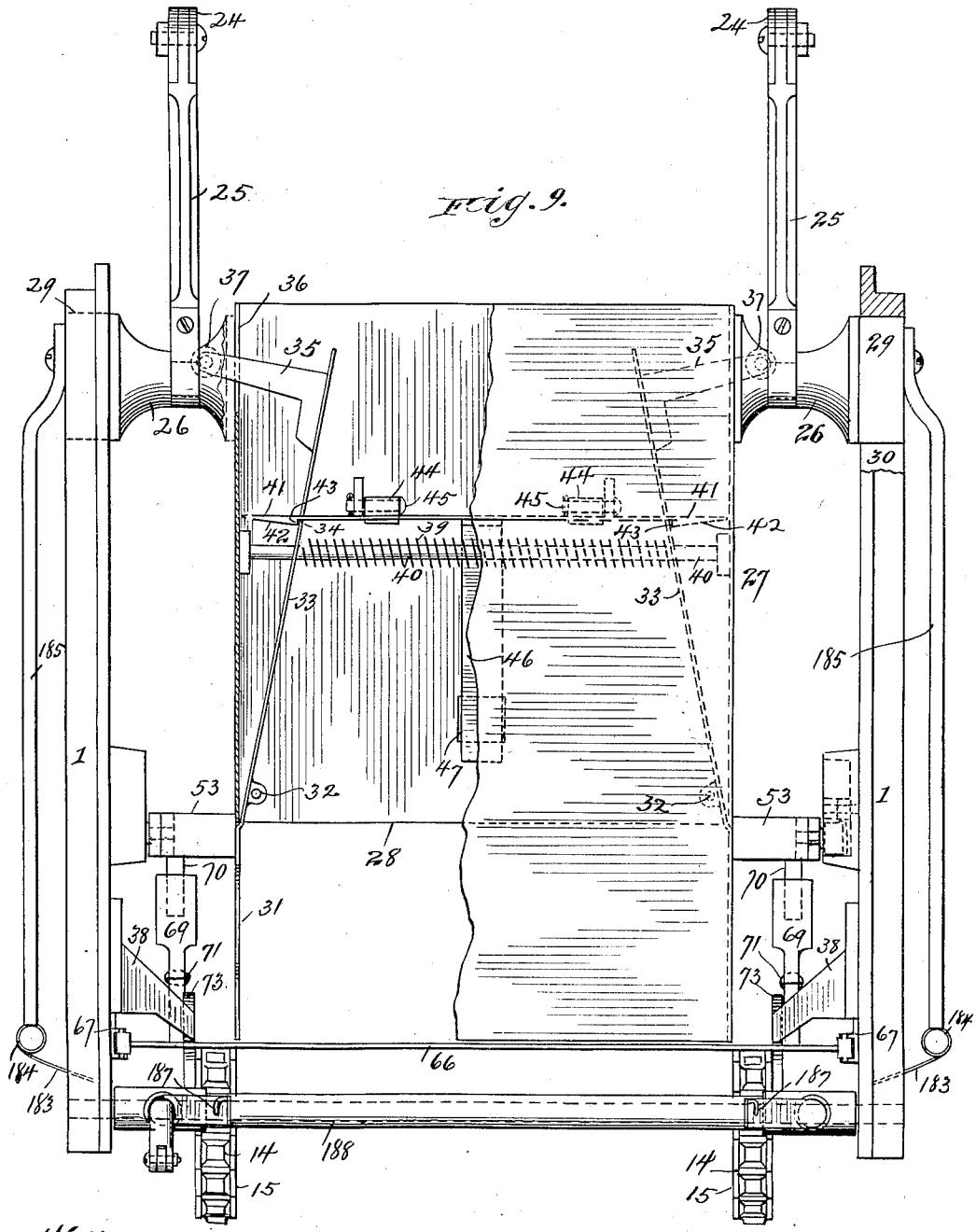
F. M. PETERS.

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(Application filed July 1, 1899.)

(No Model.) 12 Sheets—Sheet 5.

Fig. 9.



Witnesses,
F. D. Mann,
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No. 656,826. Patented Aug. 28, 1900.

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(Application filed July 1, 1899.)

(No Model.) 12 Sheets—Sheet 6.

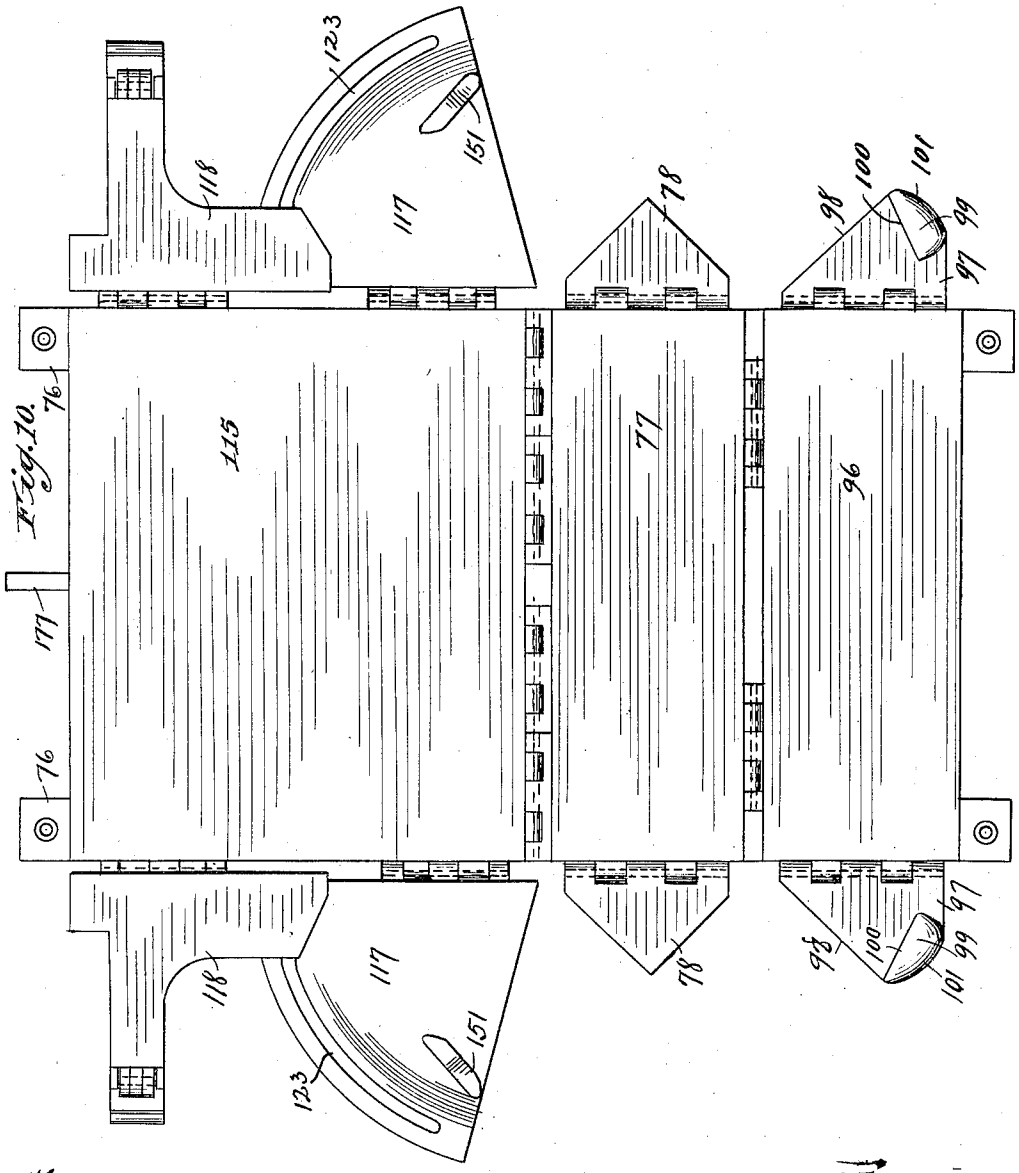


Fig. 10.

Witnesses,
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 656,826. Patented Aug. 28, 1900.

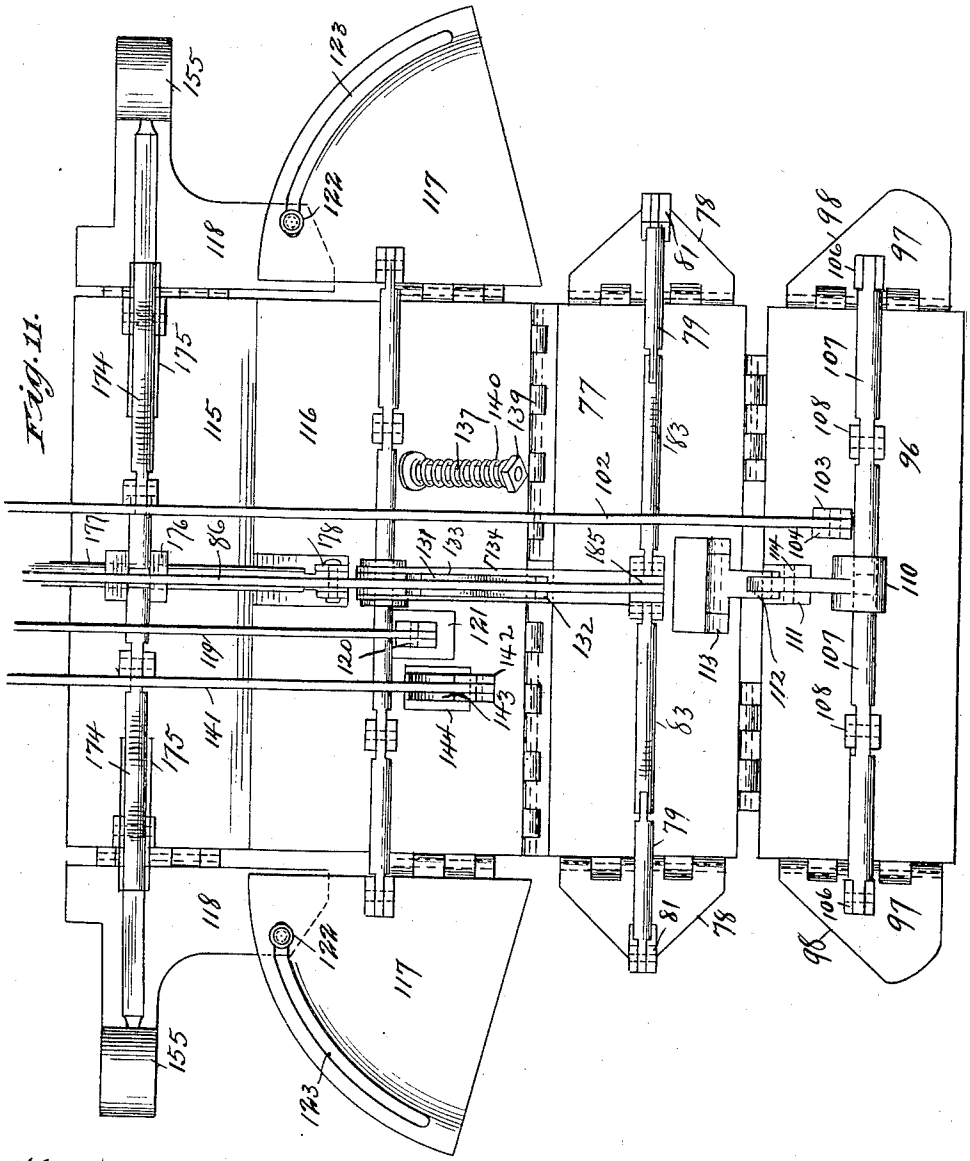
F. M. PETERS.

WRAPPING MACHINE.

(Application filed July 1, 1899.)

(No Model.) 12 Sheets—Sheet 7.

Fig. 11.



Witnesses,
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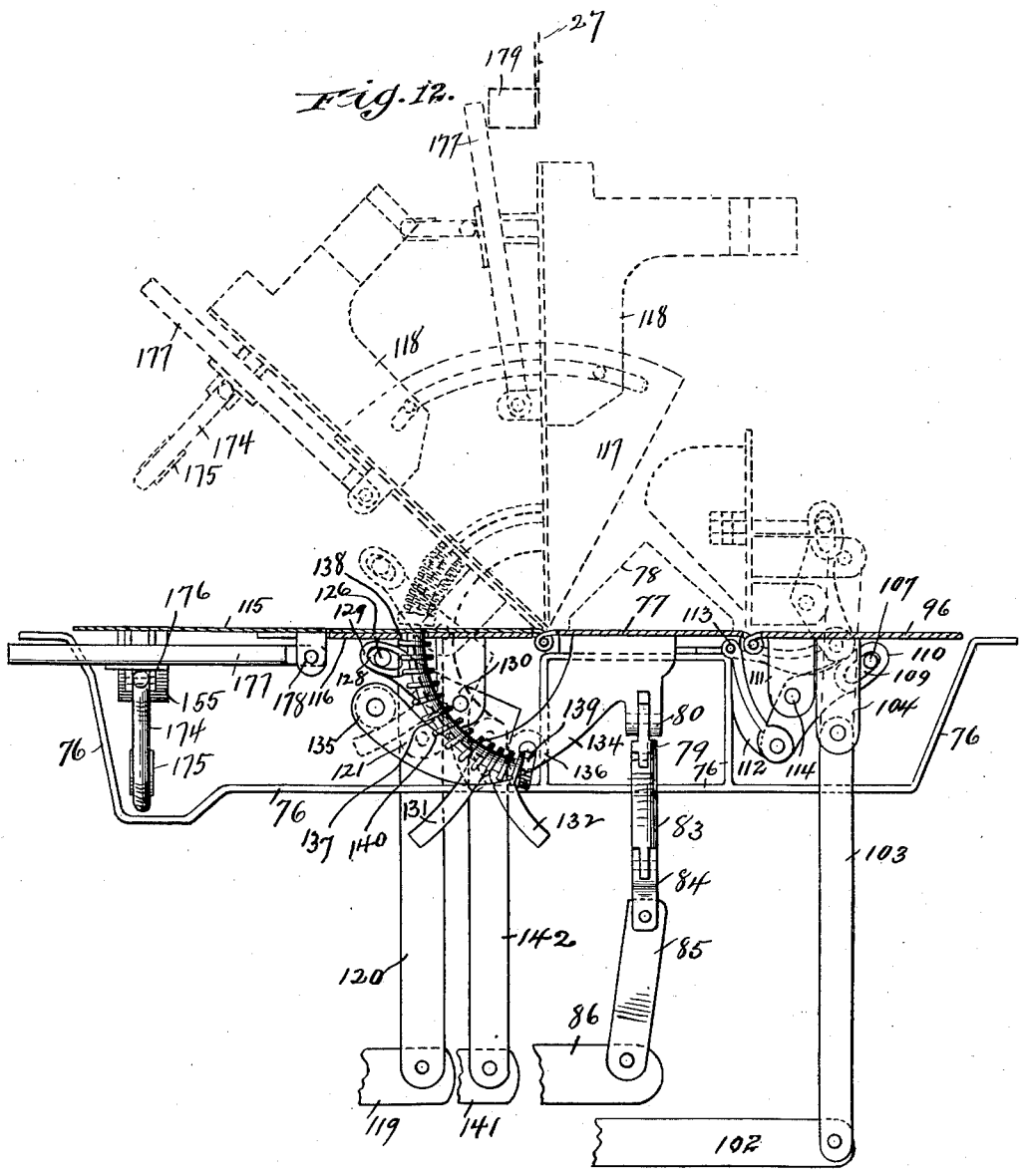
F. M. PETERS.

WRAPPING MACHINE.

(Application filed July 1, 1899.)

(No Model.) 12 Sheets—Sheet 8.

Fig. 12.



Witnesses,
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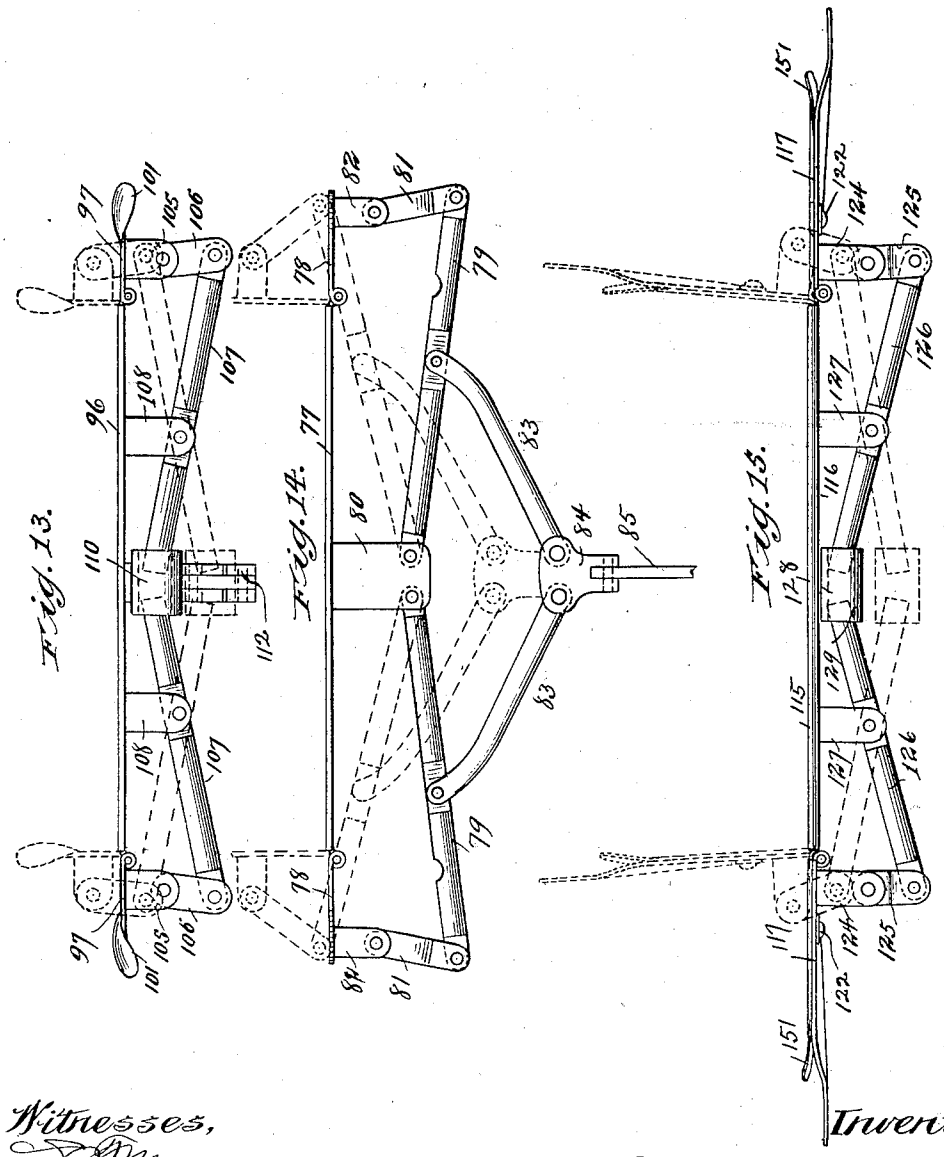
No. 656,826. Patented Aug. 28, 1900.

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(No Model.) 12 Sheets—Sheet 9.



Witnesses,
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F. M. PETERS.

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(Application filed July 1, 1899.)

(No Model.)

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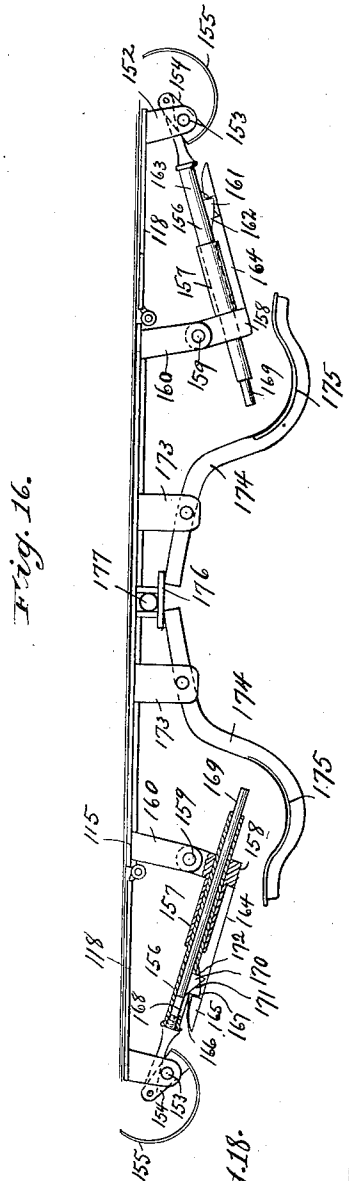


Fig. 16.

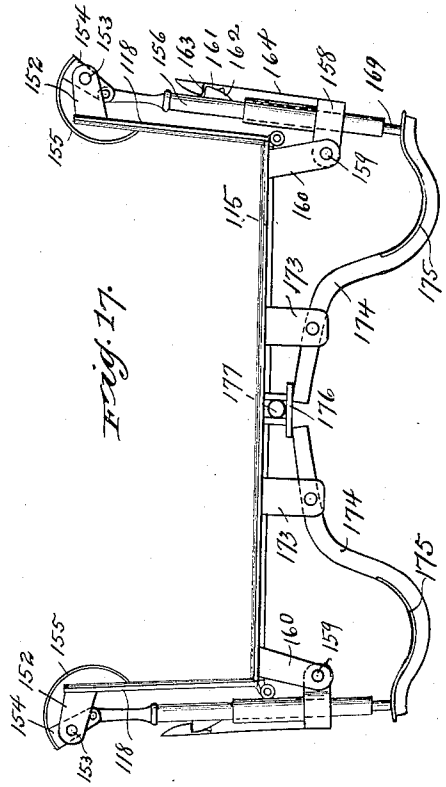


Fig. 17.

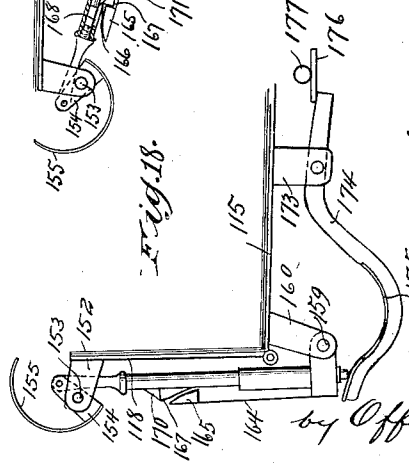


Fig. 18.

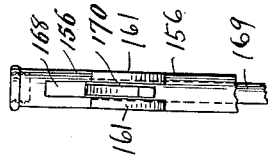


Fig. 19.

Witnesses:
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No. 656,826. Patented Aug. 28, 1900.

F. M. PETERS.

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(Application filed July 1, 1899.)

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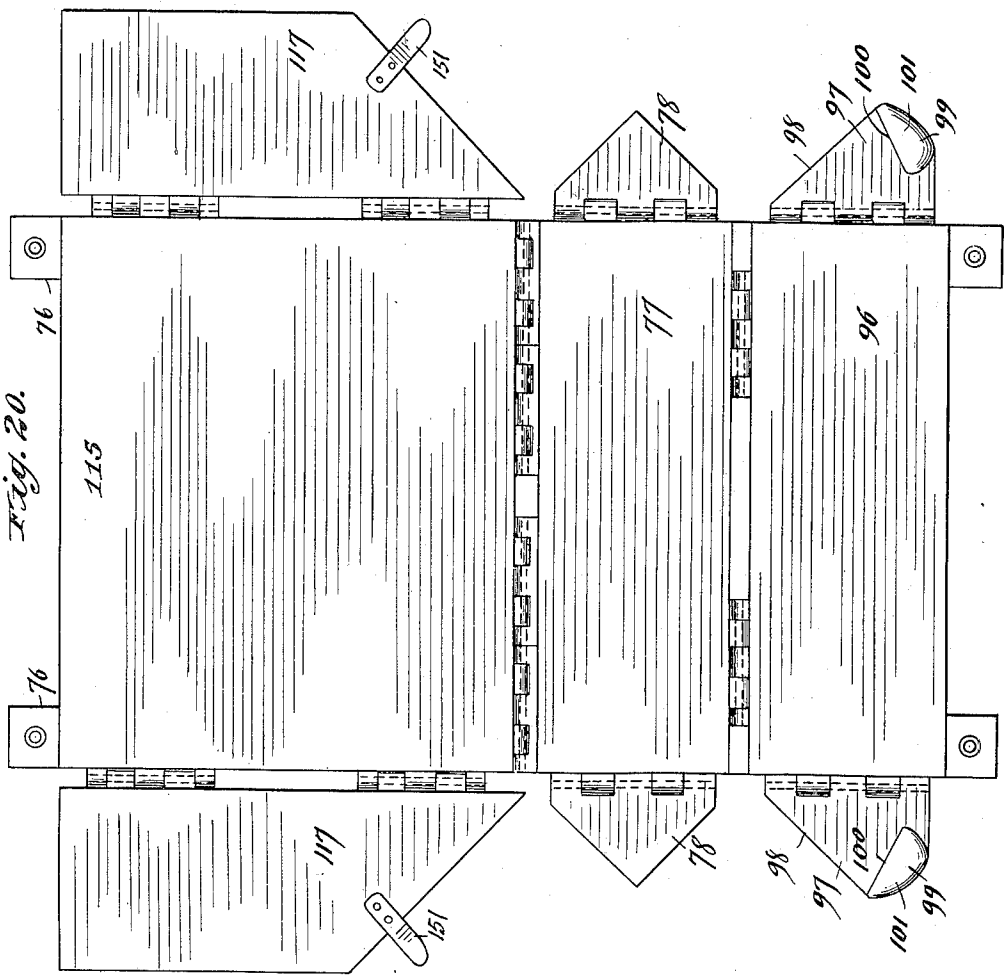


Fig. 20.

Witnesses,
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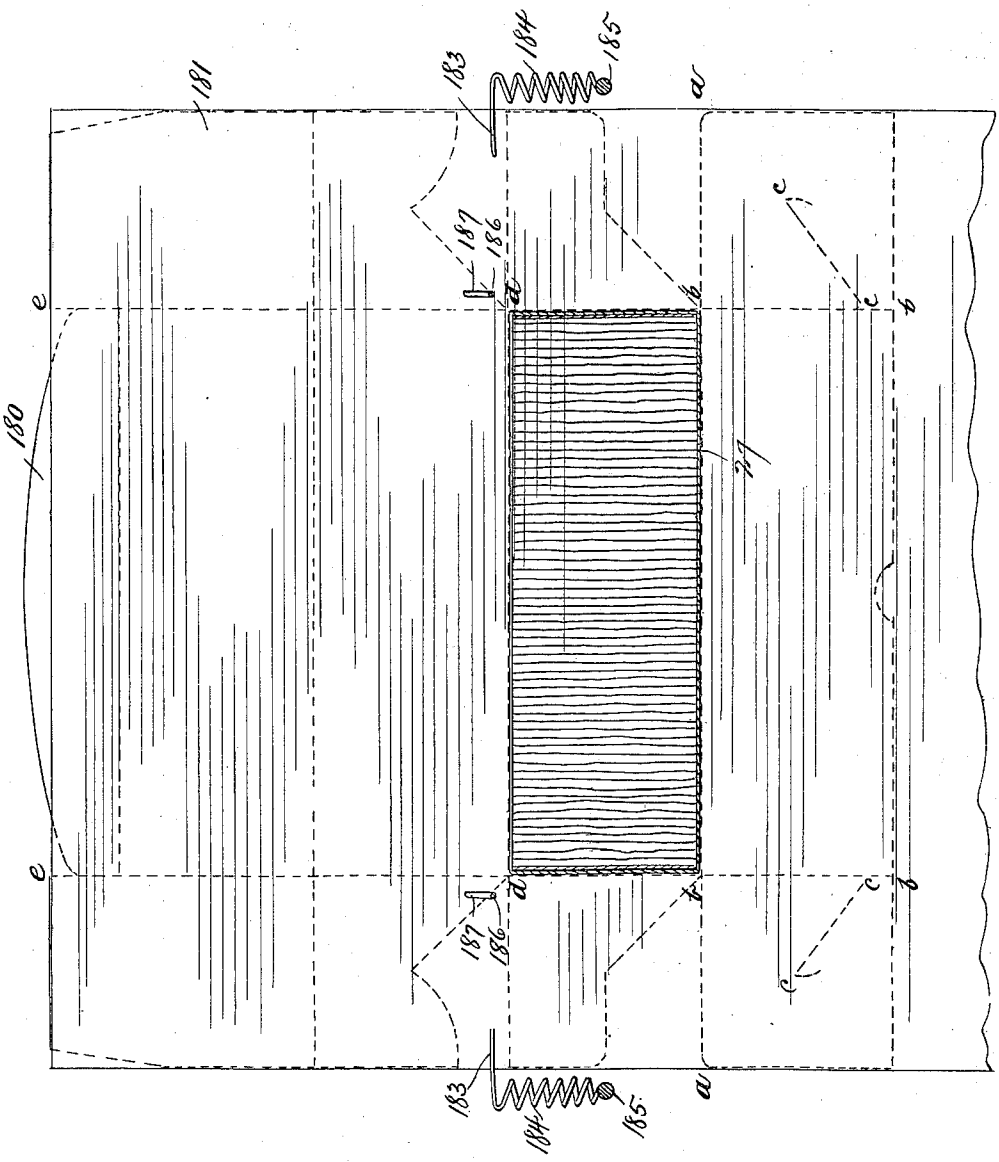
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F. M. PETERS.

WRAPPING MACHINE.

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(No Model.) 12 Sheets—Sheet 12.



Witnesses,
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UNITED STATES PATENT OFFICE.

FRANK M. PETERS, OF CHICAGO, ILLINOIS.

WRAPPING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 656,826, dated August 28, 1900.

Application filed July 1, 1899. Serial No. 722,587. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. PETERS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Packing Crackers, Biscuit, and the Like, of which the following is a specification.

This invention relates to machines for packing crackers, biscuit, and the like, and has for its object to provide an automatic mechanism whereby the objects to be packed may be carried from the point where they are received and delivered in predetermined quantities to folding devices, whereby a suitable carton or box blank, preferably provided with a lining-sheet of protective paper, will be automatically folded around the crackers, so as to inclose them in a box-like package.

The machine is designed, primarily, for use in the packing of biscuit, crackers, or the like by the method set forth in Letters Patent No. 621,974, granted to me March 28, 1899, and is designed to aid in the production of a moisture-proof and air-tight package such as is set forth in said Letters Patent.

A further and important feature of the invention is the provision of mechanism whereby all manual manipulation of the articles to be packed is avoided, the said articles being so handled by the automatic mechanism employed as to fill and set up the packages with great rapidity and precision and without the relatively-large loss by breakage which is generally incidental to the use of hand labor for these purposes.

To the ends set forth my invention consists in certain novel features, which I will now proceed to describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 is an elevation of one side of a machine embodying my invention. Fig. 2 is a similar view of the opposite side of the machine. Fig. 3 is a plan view thereof. Fig. 4 is a sectional view taken on the line 4 4 of Fig. 3 and illustrating one position of the parts of the machine which deliver the crackers to the folding devices. Fig. 5 is a similar view illustrating another position of these parts. Fig. 6 is a detail sectional view taken on the line 6 6 of Fig. 4 and looking in the direction of the arrow. Fig. 7 is an enlarged detail view, partly in section, showing the guideway for the pusher and the carrier-plate which coöperates therewith. Fig. 8 is an enlarged detail sectional view of a portion of the pusher and its coöperating devices. Fig. 9 is a front elevation, partly in section, of the combined carrier and former, whereby the crackers are delivered to the folded mechanism. Fig. 10 is a top plan view of the folding devices detached. Fig. 11 is a bottom plan view of the same, a portion of the operating devices being shown in connection therewith. Fig. 12 is a vertical sectional view of the folding devices, their normal positions being shown in full lines and the positions which they assume during the operation of folding the box or carton being shown in dotted lines. Fig. 13 is a front elevation of the first folding leaf or plate and its coöperating mechanism, the pivoted wings being shown in their normal positions in full lines and in the positions which they assume during folding in dotted lines. Fig. 14 is a similar view of the fixed plate or leaf. Fig. 15 is a similar view of the second or rear hinged leaf. Fig. 16 is a rear elevation of the rear hinged leaf and its gripping devices, the same being shown in their normal positions. Fig. 17 is a similar view showing the gripping devices in the positions which they assume when the plate or leaf is raised and before said gripping devices have been released. Fig. 18 is a view of one-half of the structure shown in Fig. 17, illustrating the position of the gripping devices when the plate or leaf has been fully raised and the said gripping devices are released. Fig. 19 is a detail view of a portion of one of the gripping devices. Fig. 20 is a plan view similar to Fig. 10, illustrating a modified construction of the folding devices adapted for use when constructing unlined packages; and Fig. 21 is a plan view of a blank and its lining, the combined carrier and former, with its complement of crackers, being shown in position thereon, the former in section, and the position of the spring-fingers which coöperate therewith being indicated.

Referring to the said drawings, 1 indicates the frame of the machine, which is preferably constructed in two parts, an upper and a lower part, as clearly indicated in Figs. 1 and 2.

In the upper part of the machine is mounted a shaft 2, provided with a driving-pulley 3 and carrying a pinion 4, which meshes with a gear-wheel 5 on a counter-shaft 6. This counter-shaft is provided with a cam-wheel 7, which has on one of its faces a cam-groove 8, which imparts a vertical movement to the combined carrier and former, while on its other face said wheel 7 is provided with a cam-groove 9, which controls the operation of the pusher. The shaft 6 is provided at one end with a sprocket-wheel 10, over which passes a sprocket-chain 11, which communicates motion by means of a second sprocket-wheel 12 to a shaft 13. This shaft 13 is provided with sprocket-wheels 14, which serve to actuate the endless conveyer, by means of which the crackers are brought to the combined carrier and former. This conveyer consists of two sprocket-chains 15, which pass over the sprocket-wheels 14, as referred to, and over idle sprocket-wheels 16 at the rear of the machine, and these sprocket-chains are connected at suitable intervals by cross-bars 17, which travel over a bed or way 18, on which the crackers rest. This bed is provided with lateral guide-walls 19, rising vertically therefrom at each side thereof. These guide-walls are not, however, supported from the bed, but from the main frame of the machine by means of suitable supporting arms or bolts 20, as indicated in Figs. 3 and 8, so as to leave a clear space between their lower edges and the top of the bed, in which spaces the chains 15 run, as indicated in Fig. 8.

The cam-groove 8 is entered by a pin 21 on an arm 22, secured to a rock-shaft 23, and said rock-shaft has forward-extending arms 24 at each side thereof, which arms are connected by links 25 to the arms 26 of the combined carrier and former, which is indicated as a whole by the reference-numeral 27. This carrier is in the general shape of a rectangular box open at top and bottom and also having a portion of its rear wall removed at the lower end thereof, as indicated at 28. It is guided by the arms 26, which are provided with blocks 29, which slide in vertical guides 30 in the frame of the machine. The lower side walls of the carrier are cut away to provide space for the gripping-plates 31, which are pivoted to the body of the carrier on axes 32, located above the opening 28. The gripping-plates have operating-stems 33, which extend upward therefrom and are shouldered, as indicated at 34, to receive the locking devices, which hold them in an inoperative position. Each stem 33 is provided at its upper end with an arm 35, which extends laterally outward therefrom through a slot 36 in the end wall of the carrier, the projecting end of the arm 35 being provided with an antifriction-roller 37, as indicated in dotted lines in Fig. 9. The frame of the machine is provided on each side with a cam-incline 38, and the rollers 37 come into contact with these inclines when the carrier reaches its downward limit of motion. The gripping-plates 31 are spring-actuated, so as to normally tend to approach each other and grip the crackers which lie between them, and for this purpose I have shown a spiral spring 39 coiled around the transverse rod 40 and bearing at each end against the operating-stems 33 of the gripping-plates 31, so as to thrust said stems normally outward and the plates normally inward toward each other. This movement of the plates is resisted by means of suitable locking devices, which in the form shown comprise two latches 41, each having a beveled end 42 and a shoulder 43, which is adapted to engage over the upper edge of the shoulder 34 of the stem 33, as indicated in Fig. 9. These latches are carried by arms 44, which are pivoted at 45 to the rear inner face of the carrier, and a releasing-arm 46 extends downward therefrom to a point opposite an opening 47 in the rear face of the carrier.

The cam-groove 9 is engaged by a pin 48, to which are connected not only a link 49, the upper end of which is loosely hung upon the rock-shaft 23, but also the rear end of a connecting-rod 51, the forward end of which is connected with and imparts a reciprocating motion in a horizontal direction to the pusher. This latter comprises a horizontally-reciprocating frame 52 and a second or auxiliary frame 53, pivotally connected therewith at its rear end, as indicated at 54, the forward end of this pivoted frame carrying the pusher-plate 55. This latter has a vertical front piece of a width equal to the width between the guide-walls 19 of the bed 18 and is yieldingly connected with the frame 53, being carried for that purpose on rods 56, which are mounted to slide through the frame 53 and are provided with springs 57, which tend to force the pusher-plate 55 forward, but permit it to yield rearward. The rods 56 are threaded at their rear ends and provided with nuts 58, which limit the forward motion of the pusher-plate 55 relatively to its frame 53. The movement of the pivoted frame 53 is controlled by guideways 59, located on the inner faces of the side frames of the machine and each comprising a horizontal lower portion 60, an upwardly-inclined return portion 61, a horizontal return portion 62, and a vertical portion 63, near the rear. A pivoted switch 64 is located at the junction of the portions 60 and 61 and occupies normally the position shown in Fig. 7 of the drawings, to which position it is returned by gravity when displaced. The pivoted frame 53 is provided with lateral projecting rollers 65, one on each side, which rollers travel in the guideways 59. The construction is such that during the forward movement of the pusher the rollers 65 travel in the lower horizontal grooves 60 and the pusher-plate 55 also travels horizontally and with its lower edge immediately above the bed 18. During this forward movement the switches 64 are lifted to permit the rollers 65 to pass and fall again into the position

shown after such passage. Upon the return movement of the pusher the rollers travel up the inclined portions 61 and along the upper horizontal portions 62, and during this portion of the movement of the pusher the pusher-plate 55 is raised in the manner shown in Fig. 5 of the drawings for the purpose hereinafter set forth. Toward the limit of the rearward movement of the pusher the rollers 65 pass downward through the vertical portions 63 of the guiding-grooves, and the pusher-plate is brought downward again toward the bed 18.

The bed 18 terminates at a point shortly in the rear of the carrier 27, and I employ to cooperate with said bed and with the pusher-plate a sliding carrying plate or extension 66, which slides horizontally in ways 67, secured to the inner faces of the side frames of the machine. This plate has on each side thereof a rearwardly-extending arm 68, provided with an upwardly-extending post or projection 69, which lies in the path of the downwardly-extending projection 70, with which the sliding frame 52 of the pusher is provided on each side. Springs 71 are connected to each of the projections 69 and to fixed projections 72 on the bed 18, on each side thereof, and these frames or others suitably arranged serve to draw the extension-plate 66 backward toward the bed 18 and away from the carrier 27. The shaft 13 is provided at each side with a cam 73, and these cams engage with the rear edge of the extension-plate 66 and serve to move it forward against the action of the springs 71. It will be observed that the shaft 13 is located under the front edge of the bed 18, so that as the conveyer reaches the end of the bed the sprocket-chains and cross-bars of which it is composed are carried downward over the front edge of said bed, and the cams 73 are so located and arranged that they engage with the extension-plate 66 upon the arrival of each cross-bar 17 at the forward edge of the bed and push said extension-plate forward away from the edge of the bed to a distance sufficient to allow the cross-bar to pass down between the two. The timing of the motion of the parts is such that as the cam 73 reaches the limit of its outward throw the projections 70 come into contact with the projections 69, and the forward movement of the plate 66 is thus continued in unison with the forward movement of the pusher-plate, and the crackers are thereby carried through the opening 28 into the carrier and former 27.

The pusher is provided with a forwardly-extending arm 74, the arrangement and location of which are such that as the pusher reaches the forward limit of its motion said arm, passing through the aperture 47 in the rear wall of the carrier, strikes against the depending arm 46, and thereby forces the latches 41 upward and releases the operating-stems of the gripping-plates 31. These latter are thereupon moved inward toward each other by the spring 39 and grip between them the crackers, which have just been conveyed forward by the combined action of the pusher and the sliding plates 66. The pusher having completed its forward motion begins to move rearward, and during this rearward movement the pusher-plate is lifted in the manner already described, and this lifting and the elevated position maintained by the pusher-plate during the greater portion of its rearward movement serve to carry it over and clear of the next batch of crackers which are being brought forward by the next cross-bar 17 of the conveyer, as illustrated in Fig. 5. When the plate 66 is moved rearward clear of the carrier 27, this latter moves vertically downward, and this motion takes place toward a horizontal table 75, which is formed by the upper part of the lower portion of the frame of the machine. This table carries the folding devices, and it is one of the functions of the carrier 27 to take the crackers from the conveyer and deliver them ready to be packed to these folding devices. The downward movement of the carrier just described continues until its lower end is immediately above the level of the table 75, and at the limit of its downward motion the rollers 37 strike against the cam-inclines 38 and press the gripping-plates 31 outward, thus releasing the crackers. The outward motion of the gripping-plates 31 and the inward motion toward each other of their stems 33 continue until the shoulders 34 of these latter, having ridden under the inclines 42 of the latches, pass clear of the shoulders 43 thereof, whereupon the said latches will drop and will hold the parts in the position shown in Fig. 9 until again released by the advance of the pusher. The carrier while thus in its lowered position upon the table 75 preferably serves as a former around which the box which is to contain the crackers is folded, and after the operation of the folding mechanism, which will be hereinafter described, has been accomplished the said carrier is moved upward by means of the mechanism described for that purpose, leaving the crackers within the box which has been formed around the carrier, said crackers having been released from the hold of the gripping-plates 31. When the carrier has been again raised to its initial position, as shown in Fig. 4 of the drawings, it stands ready to receive another charge of crackers, which charge is brought forward to it by the action of the parts already described.

It will be understood that as preliminary to the operation just described an attendant will place a suitable number of crackers upon the rear portion of the bed 18 in advance of each one of the cross-bars 17, the crackers being in a vertical position and arranged side by side, with their rear edges resting against said cross-bar, and will be thus carried upward and forward until transferred to the

sliding plate 66 and by means of said plate and the pusher-plate 55 delivered to and gripped by the carrier.

I will now proceed to describe the folding devices, which are mounted on the table 75, being normally flush with the upper face of said table, which is apertured to receive them and being supported by means of a frame 76, which is secured to the under side of said table. These folding devices consist of a plurality of hinged plates or leaves, one of which (indicated at 77) is a fixed plate secured to the frame 76 and having pivotally connected to its ends triangular wings or extensions 78, which serve to fold up the end flaps of that portion of the blank which rests upon the plate 77 and which constitutes the bottom of the completed box. The wings or extensions 78 are operated by means of levers 79, which are pivoted at their inner ends to a projection 80 on the under side of the plate 77, while their outer ends are connected by means of links 81 to arms 82 on the underside of the extensions 78. The levers 79 are in turn operated by links 83, pivoted to said levers between their ends and connected to a block 84, which is connected by a link 85 to the forward end of a lever 86, said lever being pivoted at its rear end to a support 87 near the rear of the frame of the machine. Said lever is provided between its ends with a downwardly-extending arm carrying a roller 88, which lies in the path of a cam 89, secured to a cam-shaft 90, and said cam-shaft is driven by means of a bevel-pinion 91 on its end meshing with a similar pinion 92 on the lower end of a shaft 93, the upper end of said shaft being provided with a bevel-pinion 94, which meshes with a corresponding pinion 95 on the shaft 6. To the front edge of the fixed plate 77 is hinged a similar leaf or plate 96, which is provided at its ends with pivoted wings or extensions 97, each having an inclined rear edge 98 and a projection 99 on its upper surface, terminating in a shoulder 100, which is vertical when the wing or extension is in its normal position, as shown in Fig. 10. The outer or front edge of the wing or extension is curved or flared outward, as indicated at 101 and as shown more particularly in Figs. 10 and 13. The plate 96 is moved from a horizontal to a vertical position through an arc of about ninety degrees by means of a lever 102, pivoted at its rear end to the projection 87, while its front end is connected by means of a link 103 with an arm or projection 104 on the under side of the plate 96. The wings or extensions 97 are brought to a position at right angles to the plate 96 at the same time that they assume a vertical position by means of the mechanism shown more particularly in Figs. 12 and 13. In this construction each wing or extension 97 is provided on its under side with a projecting arm 105, which is connected by a link 106 to the outer end of a lever 107, pivoted between its ends to a projection 108 on the under side of the plate 96. The inner adjacent ends of the two levers 107 extend into a slot 109 in the forward end of a lever 110, which is pivoted between its ends to a projection 111 on the under side of the plate 96. The rear end of the lever 110 has pivoted to it one end of a link 112, the other end of said link being pivotally connected to the under side of the fixed plate 77, as indicated at 113. It results from the variation in distance between the pivot 113 and the pivotal connection 114 between the lever 110 and the arm 111 that upon an upward motion of the plate 96 the front end of the lever 110 will be moved away from the under side of said plate and the inner ends of the levers 107 will be pressed downward and outward and will thereby bring the wings or extensions 97 into a position at right angles to the plate 96, as indicated in dotted lines in Figs. 12 and 13.

Pivoted to the rear edge of the fixed plate 77 is a hinged plate 115, and lying immediately below this and pivoted to the rear edge of the plate 77 on the same axis is an auxiliary plate 116, which moves for a portion of the time in unison with the plate 115. This plate 116 is provided at its ends with the extensions or wings 117, pivotally connected therewith, while the plate 115 is similarly provided at its ends with extensions or wings 118, which lie to the rear of and overlap the wings 117. The plate 116 is operated by means of a lever 119, pivoted at its rear end to the projection 87, while its front end is connected by means of a link 120 to a projection 121, on the under side of the plate 116. The wings or extensions 117 and 118 are connected with each other in pairs on each side of the machine by means of a headed projection or screw 122, which extends through a slot 123 in the wing or extension 117 and is secured to the wing or extension 118. That end of each slot 123 which lies nearest the edge of the plate 116 is straight, as clearly shown in Fig. 11, while the remainder of the slot is curved on a radius struck from the axis of connection between the plates 116 and 77 as a center. The wings or extensions 117 and 118 thus connected in pairs are moved simultaneously to bring them into a position at right angles to the plate 116 during the upward movement of this latter by means of the following mechanism, (shown more particularly in Figs. 11, 12, and 15:) Each wing 117 is provided on its under side with a projection 124, which is connected by a link 125 to the outer end of a lever 126, which is pivotally connected between its ends to a projection 127 on the under side of the plate 116. The adjacent ends of the two levers 126 extend into a slot 128 in the upper or rear end of a lever 129, which is pivoted between its ends to a projection 130 on the under side of the plate 116. The lower end of the lever 129 is bifurcated, so as to form two cam-arms 131 and 132, and said arms extend through a slot 133 in an arm 134, secured to the under side

of the plate 77, and extending thence rearwardly in a curve, as shown more particularly in Fig. 12. Mounted in the slot 133, at the rear end thereof, is a roller 135, while at its forward end there is mounted in said slot a similar roller 136, the arrangement being such that the cam 131 comes in contact with the roller 135 during the upward movement of the plate 116, while the cam 132 comes in contact with the roller 136 during the downward movement of said plate. The first-mentioned contact vibrates the lever 129 in such a way as to move the inner ends of the levers 126 downward or away from the plate 116, and thereby move the wings or extensions 117 and 118 upward into a position at right angles to the plate 116, as shown in dotted lines in Figs. 12 and 15. On the other hand, the contact of the cam 132 with the roller 136 during the downward movement of the plate 116 reverses this movement of the lever 129 and returns the wings or extensions 117 and 118 to their normal position, so that they lie in the same plane with the plate 116. Since the wings or extensions 117 and 118 are pivotally connected to the plates 116 and 115, respectively, and these plates do not lie in the same plane, the pivotal axes of the said wings or extensions are not in the same line, and it is for this purpose that the vertical or straight portions of the slots 123 are provided to permit relative motion of the two wings or extensions while being moved to and from their position at right angles to the plates to which they are pivoted.

The plate 115 is provided on its under side with a curved arm 137, which extends through an aperture 138 in the plate 116, its curvature being from the pivotal axis of the two plates as a center and it being provided with a shoulder or projection 139 at its free end. A spring 140, coiled around this curved arm, bears at one end against the under side of the plate 116, while its other end bears against the shoulder 139. The plate 116 has a limited range of upward movement, as indicated in dotted lines in Fig. 12, and in the construction shown the limit of this movement is determined by the contact of the cam-arm 131 with the roller 135, said contact acting to arrest the upward movement of the plate 116 after the wings or extensions thereof have been brought to a position at right angles thereto. The plate 115 is independently actuated beyond this limit of motion by means of a lever 141, the rear end of which is pivoted to the projection 87, while its forward end is connected by a link 142 with a curved arm 143, which is secured to the under side of the plate 115 and extends thence downward through an aperture 144 in the plate 116. The lever 141 is provided with a roller 145, which lies in the path of a cam 146 on the shaft 90.

It should be here observed that the lever 102 is provided with a similar roller 147, which lies in the path of a cam 148 on the shaft 90, and that the lever 119 is similarly provided with a roller 149, which lies in the path of a cam 150 on the shaft 90.

The construction and arrangement of the parts just referred to are such that during the upward movement of the plate 116 the wings or extensions 117 and 118 are brought into position at right angles to said plate, as hereinbefore set forth. During the continued forward movement of the plate 115 alone the wings or extensions 118 move forward along with said plate, the screws or projections 122 moving through the curved portions of the slots 123. The wings or extensions 117 are provided on their inner or upper sides, near their front edges, with elastic or spring fingers 151 for the purpose of guiding the tongues of the box-blank into the slits which are intended to receive them. The wings or extensions 118 are provided with certain gripping devices for holding the lining-sheet in position on the box-blank during the operation of folding, and these devices are shown more particularly in Figs. 16 to 19, inclusive. Each wing or extension 118 has near its outer or free end a projection 152, in which is pivoted at 153 a lever 154, which carries at one end a clamping-finger 155. The other end of said lever is connected to a rod 156, which is adapted to slide longitudinally in a sleeve-bearing 157, carried by an arm 158, pivoted at 159 to a projection 160, secured to the plate 115. The sliding rod 156 is provided with an external projection 161, having a surface 162 inclined to the axis of the rod 156 and a shoulder 163 at right angles thereto. The arm 158 carries a spring 164, which on its free end is provided with a projection 165, having an inclined surface 166 and a right-angled shoulder 167, which is adapted to engage with the shoulder 163 of the projection 161, as indicated in Figs. 16 and 17 of the drawings. The rod 156 is tubular or hollowed longitudinally and is provided near its outer end with a slot 168, and in the hollow interior of said rod 156 is mounted a stem 169, provided at its inclosed end with a projection 170, which extends outward through the slot 168 and which has an inclined surface 171 and a right-angled shoulder 172. The other end of this stem 169 projects beyond the end of the rod 156. The plate 115 is provided on its under side with projections 173, in which are pivoted cam-arms 174, having cam-surfaces 175 to engage the ends of the stems 169. The inner ends of these levers are normally in contact with a plate 176, carried by a lever 177, which is pivoted to the under side of the plate 115, as indicated at 178 in Fig. 12. This lever 177 projects rearward beyond the rearmost edge of the plate 115 and is adapted to engage a suitable fixed stop 179, which in the present instance is shown as mounted on the outer face of the rear wall of the combined carrier and former 27.

The operation of the gripping devices is as

follows: During the upward movement of the plate 116, and the consequent movement of the wings or extensions 118 relatively to the plate 115, the variations in distance between the pivotal centers 153 and 159 causes the rods 156 to so act upon the levers 154 as to swing the clamping-fingers 155 from their open position shown in Fig. 16 to the closed position shown in Fig. 17, in which they press upon the faces of the wings 118 and hold the lining-paper and carton firmly in place against the same at those points. It will be understood, of course, that during this movement the shoulder 167 of the projection 165 is in engagement with the shoulder 163 of the projection 161, so that the rod 156 is not free to move longitudinally relatively to the sleeve 157. During the latter portion of this movement from the position shown in Fig. 16 to that shown in Fig. 17 the free ends of the stems 169 ride upon the surfaces 175, but without exerting any such pressure as would cause an upward or outward movement of said stem toward the gripping-fingers. When, however, the plate 115 has moved forward to the limit of its upward or forward movement, it is necessary to release the gripping devices before the return movement of this plate, and this is accomplished by the striking of the free end of the lever 177 against the fixed projection 179, whereupon the plate 176 will press against the inner ends of the levers 174 and will cause their outer ends in turn to press against the exposed ends of the stems 169. These stems will then move longitudinally toward the gripping-fingers, and this movement will cause the inclines 171 of the projections 170 to bear against the projections 165 and force these latter away from the rods 156, so as to disengage their shoulders 167 from the shoulders 163 of the projections 161 on said rods. When this has occurred, the stems 169 have reached the limit of their movement relatively to the rods 156, and the further pressure exerted on said stems by the levers 175 causes them to move the rods 156 along with them and operates on the levers 154 to throw the gripping-fingers 155 back into the open position shown in Fig. 18, which position they maintain during the return movement of the parts.

The spring connection between the plates 115 and 116 is such that the plate 116 is maintained in its angular position (shown in dotted lines in Fig. 12) until the return of the plate 115 to contact therewith, whereupon the two plates return in unison to their original position. By reason of this mode of operation the projections 122 are prevented from binding or catching in the curved portions of the slots 123, since the extensions 117 maintain their position at right angles to the plates as long as the plate 116 is stationary in its angular position. (Shown in Fig. 12.) During the joint receding motion of the two plates the pins 122 move through the straight portions of the slots 123 and permit the wings or extensions of both plates to assume their normal positions in the same horizontal plane with said plates.

I will now proceed to give a general description of the operation of the folding devices as thus organized. These folding devices are intended to operate upon a blank substantially such as is shown in Fig. 21 of the drawings and there indicated by the numeral 180. This blank has placed upon it a sheet of protective paper 181, and the blank and lining-sheet are then placed upon the folding devices in such a manner that that portion of the blank which is to form the bottom of the box rests upon the fixed plate 77. The carrier then descends and places the crackers in position upon the lining and blank over said plate 77. Through the mechanism provided for that purpose the plate 96 is then moved upward and folds the blank and lining along the line *a a* of Fig. 21, while at the same time the wings or extensions 98 move to a position at right angles to the plate 96 and fold the flaps of the blank along the lines *b b* of Fig. 21. During this latter operation the projections 99 press against the material of the blank immediately outward from or beyond the slits *c c*, which are to receive the tucking-flaps, and cause said slits to gape or open ready to receive said flaps. For this purpose the end walls of the carrier are recessed or cut away, as indicated at 182, so as to permit the portions of the blank pressed against by the projections 99 to yield inward in the manner described. The wings 78 at the ends of the fixed plate 77 are then next moved upward by the mechanism described for that purpose and further fold the blank and lining along the lines *d b*. The plates 115 and 116 thereupon are moved upward in unison, and this upward movement of said plates serves to begin the folding of the blank and lining along the line *d d*, and at the same time the wings 117 and 118 move to a position at right angles to the plates 115 and 116 and fold the blank and lining along the lines *d e*. During this movement of the parts the gripping-fingers move over the edge of the blank and serve to firmly grip the lining against the blank and also to clamp both lining and blank against the wings 118. When the movement of the plate 116 ceases, that of the plate 115 continues, and during this movement the folding of the blank along the line *d d* is completed. It is also during this movement that the tucking-flaps are inserted into the slits *c c*, which are held open to receive them by the projections 99, and the curvature of the extremities of the wings 97 serves to aid in guiding the ends of the tucking-flaps into position. The yielding or spring fingers 151 further serve to hold these tucking-flaps in such position that they will enter the slits provided for them and will thereby complete the formation of the body of the box. It will be understood that the

lining of the protective paper is folded along with the blank in the manner set forth in my prior patent hereinbefore referred to, and thus becomes interfolded with the flaps of the blank to make an air-tight package. It will also be understood that during the operation of the folding mechanism the carrier 27 remains in position on the fixed plate 77, being withdrawn after the folding is completed and leaving the crackers within the folded lined box thus formed. The several parts return to their normal position in a manner which will be readily understood, and when the several plates and their extensions are again flush with the flat top of the table 75 they are again in position to receive a fresh blank and a fresh charge of crackers.

While, as I have already stated, the mechanism described will fold both the blank and the lining-sheet simultaneously, I may employ certain adjunctive devices for the more effective folding of the lining-sheet along with the blank. These devices consist of certain yielding or spring fingers, which I will now proceed to describe.

In Figs. 9 and 21 of the drawings I have shown yielding or spring fingers 183, which may be formed of comparatively-light spring-wire and may be provided with a coiled body 184 to increase their elasticity. These fingers are supported by means of downwardly-extending arms 185, which are attached to and extend downward from the guide-blocks 29, which move along with the combined carrier and former 27. These fingers 183 press yieldingly against the lining-paper at the edges thereof along the line of fold *d d*, so that during the folding along this line, as well as along the lines *d e*, the paper is so held at its outer margins as to insure its folding along the desired lines. In connection with these spring-fingers I also employ a second pair of spring-fingers 186, each terminating in a curved toe 187 and also made of flexible spring-wire or other suitable yielding material. These fingers are carried by a rock-shaft 188, which is mounted in the upper portion of the frame of the machine and is operated by means of an arm 189, which is connected by a link 190 to the upper end of a lever 191. This lever extends downward through a slot in the table 75 and is pivoted at 192 to an arm 193 underneath said table. The lower end of the lever 191 is provided with a roller 194, which is held against a cam 195 on the shaft 90 either by gravity or by a spring 196, as shown. The operation of these parts is such that upon the downward movement of the carrier the spring-fingers 186 are at the same time moved into the vertical position shown in Fig. 5, so that they stand vertically at the angles of the lines of fold *d d* and *d e*. This position they maintain during the folding operation, and thereby serve to define the vertical lines of fold of the lining-paper at the two rear corners of the box. At the proper time the cam 195 operates to rock the shaft 188, whereupon these spring-fingers move forward and upward, and during this movement they are drawn along the vertical angles of the lining-papers at the front corners of the box and serve to define these angles and the lines of fold at said angles.

The particular form of folding devices just described is, as stated, one particularly adapted for use when the packages embody a lining, as well as an outer box or carton. My invention also contemplates, however, the construction of a machine adapted for use in the packing of crackers in boxes which are unlined or in which the lining is so secured to the box-blank as to require no special devices to retain it in place during the folding operations. Such a construction of the folding devices is shown in Fig. 20 of the drawings and differs from that already described only in that the auxiliary plate 116 is dispensed with, as well as the wings or extensions 118, with their gripping devices and the coöperating mechanism. In this construction the extensions 117 are pivoted directly to the hinged plate 115 and extend the entire length thereof, as clearly shown in Fig. 20.

Considering the machine as a whole, it will be seen that crackers or other articles placed upon the bed or table of the conveyer will be automatically delivered to the carrier and by this latter will be carried to the folding devices and there held while the box-blank, either lined or unlined, is folded around the former and its contents, so that the body of the box is completed, leaving only the closing of the same by the folding and tucking in of the top. The operation of the machine is entirely automatic, except for the supplying of the crackers to the conveyer and of the box-blanks and lining-sheets to the folding devices and the removal of the filled boxes, and the nature of the construction is such that the work is performed at a high rate of speed and with a minimum of breakage of the crackers.

While I have described the particular mechanisms employed for producing particular movements of the parts with considerable minuteness in order that their operation may be comprehended, I do not wish to be understood as limiting myself precisely to the details of construction set forth, as it is obvious that these details may be varied without departing from the broader principles of my invention; nor is it always necessary to embody all of the features of my invention in one machine, as it is obvious that although the particular groups of mechanism set forth are so organized as to coöperate with each other to produce a unitary result, yet the folding devices might be used to fold a box around crackers or other articles delivered thereto by other mechanisms than those set forth and the particular conveying and carrying mechanisms might be employed with other forms of folding mechanism. Again, it is not essential that a conveyer or the carrier be

used in connection with the folding mechanisms shown and described, for the articles to be packed may be charged into the carrier by hand and the conveyer omitted or, so far as the novelty of the folding machanisms *per se* is concerned, the articles may be placed upon the blank and the carrier omitted, and if a conveyer be used it is not essential that it shall be of the particular construction shown, nor that it shall be arranged in relation to the carrier, as specified. I desire to call attention to the fact that the sliding plate 66 serves in the machine organized as delineated in the drawings the useful purpose of affording a temporary or false bottom for the conveyer to support the articles therein, as well as to convey said articles from the conveyer to the carrier. I desire also to call attention to the fact that the provision of the carrier with an open rear side permits crackers of slightly-varying dimensions to be packed without danger of breaking them.

My apparatus will be found serviceable in assembling and wrapping a number of articles which are to be faced or brought together into a body or mass having symmetrical outlines, in packing which class of goods problems are presented which are not found in those wrapping-machines wherein the articles to be wrapped or packed can be delivered from a chute.

My mechanism in some of its features of construction and organization is especially adapted to the handling of fragile materials; but if employed for packing articles not liable to be broken some of the features thereof might be modified or omitted.

I claim—

1. In a machine for packing crackers, biscuit and the like, the combination, with a folding-table to receive a box-blank, of a conveyer adapted to supply the crackers in groups containing a predetermined quantity, and a carrier adapted to receive the crackers from the conveyer, to carry them to the folding-table and to hold them in position thereon said carrier constituting with the crackers a form around which the box-blank is folded, substantially as described.

2. In a machine for packing crackers, biscuit and the like, the combination, with a folding-table to receive a box-blank, of a conveyer adapted to supply the crackers in groups containing a predetermined quantity, and a carrier adapted to receive the crackers from the conveyer, to carry them to the folding-table and to hold them in position thereon, said carrier constituting with the said crackers or the like a form around which the sides of the box-blank are folded, and said table being provided with automatic folding devices to fold the box-blank, substantially as described.

3. In a machine for packing crackers, biscuit and the like, the combination, with a conveyer adapted to supply the crackers in groups containing a predetermined quantity, of a folding-table adapted to receive a box-blank and provided with automatic mechanism for folding said blank, and a carrier movable between the conveyer and folding-table and adapted to receive the crackers from the conveyer and carry them to the folding-table and to hold them in position thereon and constituting with said crackers or the like a form around which the box-blank may be folded, and automatic means for actuating said carrier to move it from the conveyer to the folding-table and to withdraw it from the folding table to the conveyer after the operation of the folding mechanism, substantially as described.

4. In a machine of the character described, the combination, with a folding-table and a hollow carrier adapted to receive the crackers and deliver them to the folding-table, of an endless conveyer adapted to supply the crackers in groups containing a predetermined quantity, and a sliding plate intermediate the conveyer and carrier and adapted to receive the crackers from the conveyer and move with them to the carrier, substantially as described.

5. In a machine of the character described, the combination, with a conveyer adapted to supply the crackers in groups containing a predetermined quantity, a folding-table and a hollow carrier adapted to receive the crackers and deliver them to the folding-table, and a pusher located intermediate the conveyer and carrier and adapted to engage the crackers and move them into the carrier, substantially as described.

6. In a machine of the character described, the combination, with a vertically-movable carrier and an endless conveyer, of a sliding plate located between the conveyer and carrier and adapted to move from the former under the latter and back again, and a reciprocating pusher also intermediate the conveyer and carrier and adapted to reciprocate between the two so as to engage the crackers as they move forward and assist the sliding plate in delivering them into the carrier, substantially as described.

7. In a machine of the character described, the combination, with a hollow carrier, a conveyer and a movable plate reciprocating between the two, of a pusher also reciprocating between the two, and means for lifting said pusher during its return stroke to cause it to clear the incoming group of crackers, substantially as described.

8. In a machine of the character described, the combination, with a folding-table, a carrier and a conveyer, of a pusher intermediate the carrier and conveyer and provided with a yielding pushing-plate to bear against the crackers during the forward movement of the pusher, substantially as described.

9. In a machine of the character described, the combination, with a conveyer comprising a fixed bed, endless chains connected at intervals by cross-bars which travel over the

bed, and means for actuating said chains, of a sliding plate forming a forward extension of the bed, a carrier located in front of the bed, and means for moving said sliding plate forward under the carrier during the passage of each one of the cross-bars around the front edge of the bed and returning said sliding plate to its normal position after such passage, substantially as described.

10. In a machine of the character described, the combination, with a folding-table and a conveyer, of a combined carrier and former, movable between the two and comprising a hollow body open at the rear to receive the crackers from the conveyer and provided with gripping devices and with means for actuating said gripping devices to seize the crackers after they are received from the conveyer and to release them after they are delivered to the folding-table, substantially as described.

11. In a machine of the character described, the combination, with a folding-table and a conveyer, of a combined carrier and former, reciprocating between the two and comprising a hollow body, pivoted gripping-plates located at the lower portion of the ends thereof, a spring for normally moving said gripping-plates to engage the crackers, a locking device for holding said gripping-plates away from the crackers, means for releasing said locking device after the crackers have been delivered from the conveyer to the carrier, and means for returning said gripping-plates to their release position and reengaging the locking device therewith at the end of the movement of the carrier toward the folding-table, substantially as described.

12. In a machine of the character described, the combination, with a hollow carrier, provided with spring-actuated gripping-plates and a locking device for holding them in inoperative position, of a conveyer, and a pusher intermediate the conveyer and carrier and provided with a projection to engage and free the locking device to permit the gripping-plates to act, substantially as described.

13. In a machine of the character described, the combination, with a folding-table and a conveyer having its discharge-terminal located above said table, of a hollow carrier provided with gripping-plates and vertically reciprocating between the conveyer and table, said carrier being open at the rear to receive the crackers, mechanism for transferring the crackers in groups from the conveyer to the carrier and for causing the gripping devices to act to hold the crackers after such transfer, and means for releasing the gripping devices when the carrier reaches the folding-table, substantially as described.

14. In a machine for packing crackers and the like, the combination, with a fixed horizontal plate on which the bottom portion of the box-blank may rest, of movable plates hinged to the side and end margins of said fixed plate and lying normally in the same plane therewith, means for moving said hinged plates into positions at right angles to the fixed plate to fold up the sides and ends of the box-blank, and a carrier for the crackers adapted to deliver the crackers upon the box-blank and to hold them in position therein and constituting with the crackers a form around which the sides of the box-blank are folded, substantially as described.

15. In a machine of the character described, the combination, with a fixed horizontal plate of substantially-rectangular form on which the bottom of the box-blank may rest, of four normally-horizontal plates respectively hinged to the four edges of said fixed plate, the front and rear hinged plates being provided at their lateral ends with pivoted wings or extensions, the pivotal axes of which are at right angles with those of the plates to which they are hinged, and means for moving said hinged plates into a position at right angles to the fixed plate and for moving said pivoted wings or extensions into positions at right angles to the plates to which they are hinged, substantially as described.

16. In a machine of the character described, the combination, with a fixed horizontal plate on which the bottom of the box-blank may rest, of normally-horizontal movable plates hinged to the margins of said fixed plate, one of said hinged plates being provided at its ends with pivoted wings or extensions having projections to engage the box-blank and open the slits thereof, and another of said hinged plates being provided at its ends with pivoted wings or extensions having yielding fingers to guide the tongues of the box-blank into the slits, and means for actuating said hinged plates and their extensions, substantially as described.

17. In a machine of the character described, the combination, with a fixed horizontal plate to receive the box-blank and a lining-sheet thereon, and the folding-plates pivoted to the front and end edges thereof, of a two-part folding-plate pivoted to the rear edge of said fixed plate, each of said parts having pivoted extensions or wings, those of one plate being provided with yielding guide-fingers and those of the other plate being provided with gripping devices to hold the lining-sheet in position, and means for actuating the several movable parts, substantially as specified.

18. In a machine of the character described, the combination, with the fixed bottom plate and its front and lateral folding devices, of a plate pivoted to the rear edge of said fixed plate and comprising a lower and an upper part, the former movable through a lesser angle and having pivoted end wings or extensions, and the latter movable through a greater angle, first in unison with the lower plate and then independently, and provided with pivoted end wings or extensions having gripping devices and a sliding connection with the wings or extensions of the lower plate, and means for first lifting both plates and simultaneously bringing the wings or extensions

to position at right angles to said plates and actuating the gripping devices, and for then moving forward the upper plate independently and releasing the gripping devices at the end of the forward movement of the upper plate, substantially as described.

19. In a machine of the character described, the combination, with the two rear folding-plates, each provided with end wings or extensions, one of each pair whereof has a curved slot terminating in a straight portion, while the other has a projection to engage said slot, of a spring acting to move said plates toward each other, and means for first simultaneously raising both plates, then continuing the upper motion of the upper plate and finally returning said plates to their normal position, substantially as described.

20. In a machine of the character described, the combination, with a vibrating folding-plate, having end wings or extensions, of gripping-fingers pivotally connected to said end wings or extensions and lying with their gripping edges normally in a common plane therewith, means for moving said folding-plate, simultaneously causing the wings or extensions thereof to move into positions at right angles thereto, mechanism whereby this latter movement causes the gripping-fingers to project over the edges of the extensions and press against the faces thereof, and means for releasing said gripping-fingers when said movement of the folding-plate is completed, substantially as described.

21. In a machine for simultaneously folding a box-blank and the loose lining thereof, the combination, with pivoted folding-plates, of gripping devices carried by said plates to hold the lining in position thereon, and means for releasing said gripping devices at the conclusion of folding operations of the plates, substantially as described.

22. In a machine for simultaneously folding a box-blank and the loose lining thereof, the combination, with a fixed plate having hinged folding-plates connected therewith and automatic mechanism for operating said folding-plates, of a carrier movable toward and from said fixed plate, and yielding fingers carried by said carrier and adapted to project over the edges of the lining during the operation of the folding-plates, substantially as described.

23. In a machine for simultaneously folding a box-blank and a loose lining therefor, the combination, with folding devices and a carrier movable toward and from the same, of yielding fingers pivotally mounted above said devices, means for swinging said yielding fingers into vertical position alongside the carrier while it is depressed, and means for returning said yielding fingers to their normal position after the operation of the folding devices, substantially as described.

24. In a machine for simultaneously folding a box-blank and a loose lining therefor, the combination, with folding devices having gripping-fingers to hold the lining-sheet in position, of a carrier movable toward and from said folding devices and provided with yielding fingers to extend over the edges of the lining-sheet, and pivoted yielding fingers provided with mechanism for moving them into a vertical position alongside the carrier when depressed, and for returning them to their normal horizontal position after the operation of the folding devices, substantially as described.

25. In a machine of the character described, the combination, with a hollow box-like carrier for holding and carrying the crackers or other articles to be packed, of a fixed plate toward and from which said carrier is movable, and on which the bottom portion of a box-blank may rest, and folding-plates pivotally connected to said fixed plate and adapted to operate to fold the box-blank around the sides of the carrier and around the crackers contained therein, substantially as described.

26. In a machine of the character described, the combination, with a hollow carrier provided with gripping-plates to receive and hold a group of crackers, of a fixed plate on which a box-blank may rest, and folding-plates pivoted to the margins of said fixed plate, means for moving said carrier toward the fixed plate, means for actuating said folding-plates to fold the box-blank around the carrier, means for releasing the gripping-plates, and means for withdrawing the carrier and thereby leaving the crackers in the box, substantially as described.

27. In a machine for packing crackers, biscuit and the like, the combination, with a folding-table having a fixed plate and normally horizontally folding-plates pivoted to the margins thereof, of automatic mechanism for actuating said folding-plates, a conveyer adapted to supply the crackers in groups containing a predetermined quantity, a carrier and former of hollow box-like form, adapted to receive the crackers from the conveyer, means for moving said carrier to the fixed plate of the folding-table, whereon the box-blank is folded around said carrier and its contents, said carrier and former being provided with gripping devices to hold the crackers during their transit from the conveyer to the folding-table, automatic means for releasing said gripping devices after such transit, and automatic means for withdrawing said carrier after the operation of the folding devices, whereby the crackers are left in the box just formed, substantially as described.

28. In a machine for packing crackers, biscuit and the like, a carrier adapted to receive the articles to be packed, to carry them to the folding or packing table and to hold them in position thereon and constituting with such crackers a form around which the sides of the blank are folded, substantially as described.

29. In a machine for packing crackers, bis-

cuit and the like, the combination, with a folding table or support for a box-blank, of a hollow carrier adapted to contain the articles to be packed, and said table or support and said carrier having relative movement whereby the articles may be brought into position to be inclosed or infolded by the blank, said carrier constituting with its contents, a form around which the sides of the blank are folded, substantially as described.

30. In a machine for packing biscuit, crackers and the like, the combination, with a folding table or support for a box-blank, of a hollow carrier adapted to contain the articles to be packed, and said table or support and said carrier having relative movement whereby the articles may be brought into position to be inclosed when infolded by the blank and said carrier and the articles to be packed constituting a form, and automatically-operating folding means for folding the sides of the blank around said form, substantially as described.

31. In a machine for packing biscuit, crackers and the like, the combination, with a folding table or support for a box-blank, of a hollow movable carrier adapted to contain the articles to be packed and to be moved with its contents to the blank, whereby the articles may be brought into position to be inclosed or infolded by the blank and constituting with its contents a form around which the sides of the blank are folded, substantially as described.

32. In a machine for packing biscuit, crackers and the like, the combination, with a folding table or support for a box-blank, of a hollow movable carrier adapted to contain the articles to be packed, whereby the articles may be brought into position to be inclosed or infolded by the blank and constituting with said articles a form around which the sides of the blank may be folded, and automatically-operating means for folding said sides, substantially as described.

33. In a machine for packing crackers, biscuit and the like, the combination, with a folding table or support for a box-blank, of a movable hollow carrier for containing the articles to be packed and carrying them into position to be infolded by the box-blank, said carrier and the articles carried thereby constituting a form around which the sides of the blank are folded, and means for charging the articles into the carrier, substantially as described.

34. The combination, with a bottomless, hollow, reciprocating carrier having an opening in its side, of a sliding plate for carrying articles into said carrier, and means for moving the parts in due order and relation, whereby to first charge the articles into said carrier and then to move the latter with its contents, substantially as described.

35. The combination, with a hollow carrier, of folding mechanism comprising folding-wings, and actuating mechanism whereby the carrier is caused to move into position over the folding devices, and the latter actuated to infold the articles to be packed while in the carrier, and means for moving the latter away, leaving the articles wrapped upon the folding-table, substantially as described.

FRANK M. PETERS.

Witnesses:
IRVINE MILLER,
C. C. LINTHICUM.