(No Model.) 13 Sheets—Sheet 1.

A. J. BATES.

CELL CASE MACHINE.

No. 570,621. Patented Nov. 3, 1896.

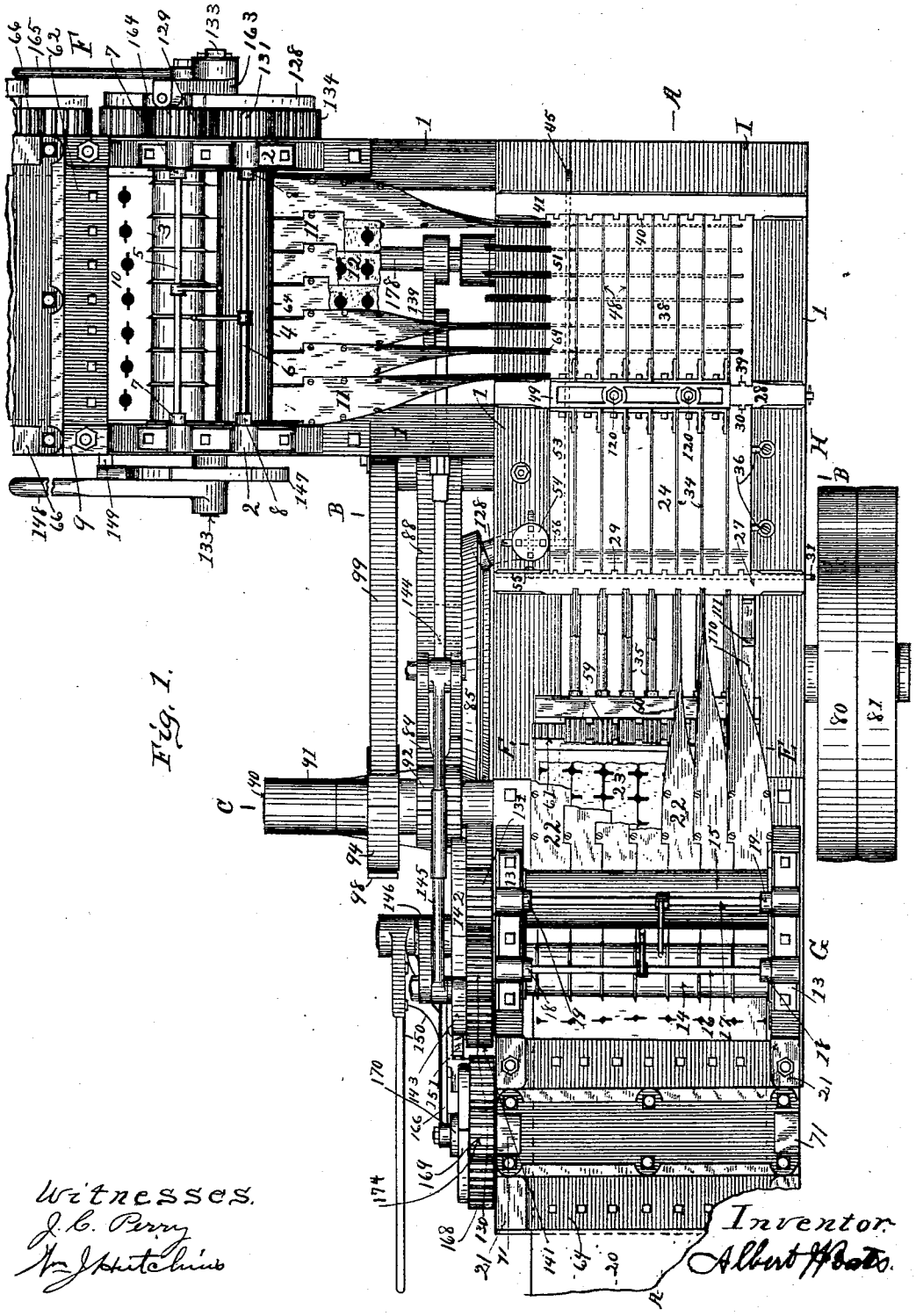

Fig. 1.

Witnesses.
J. C. Perry
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Inventor.
Albert J. Bates.

(No Model.) 13 Sheets—Sheet 2.

A. J. BATES.

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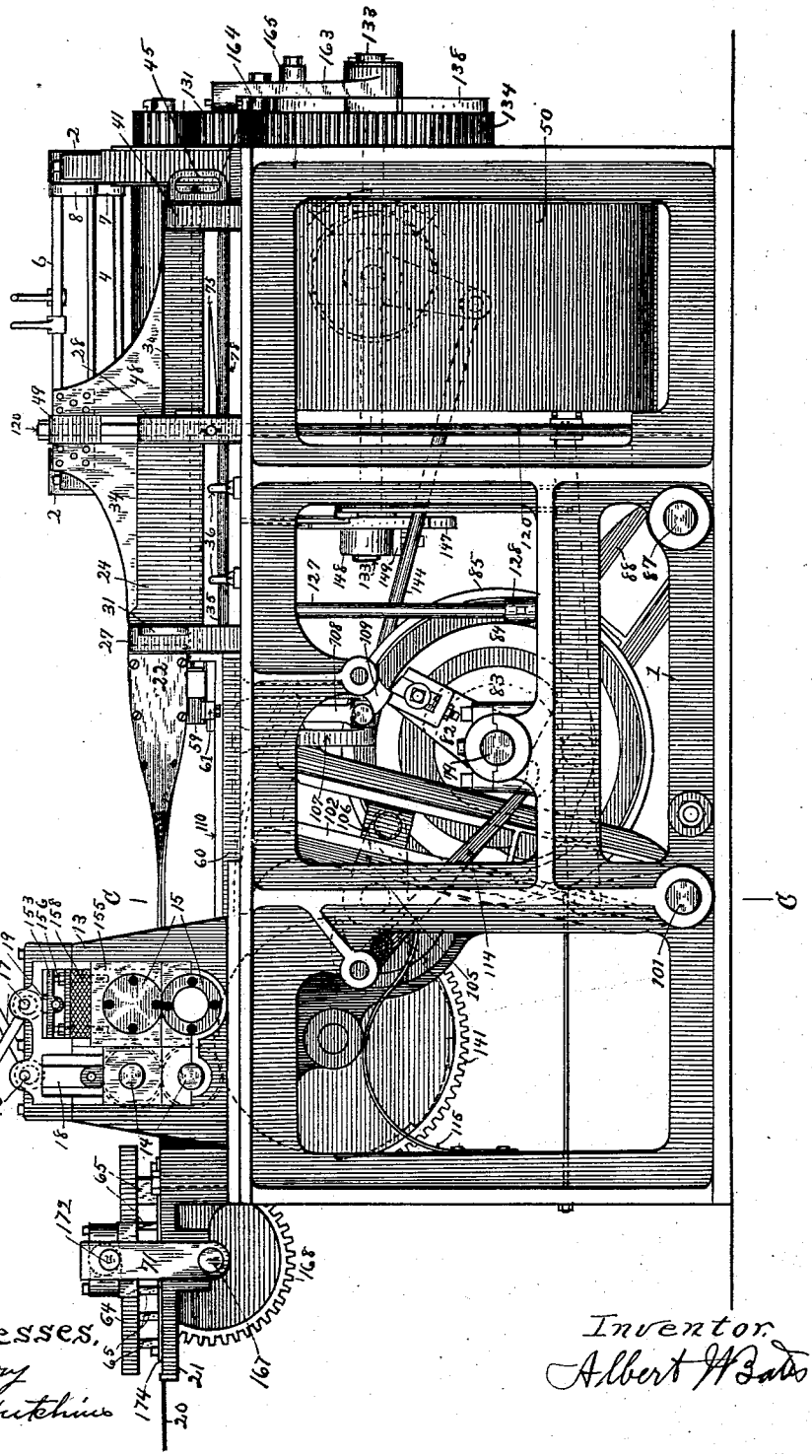

Fig. 2.

Witnesses,
J. C. Perry
Wm. J. Hutchins

Inventor.
Albert J. Bates.

(No Model.)

13 Sheets—Sheet 3.

A. J. BATES.

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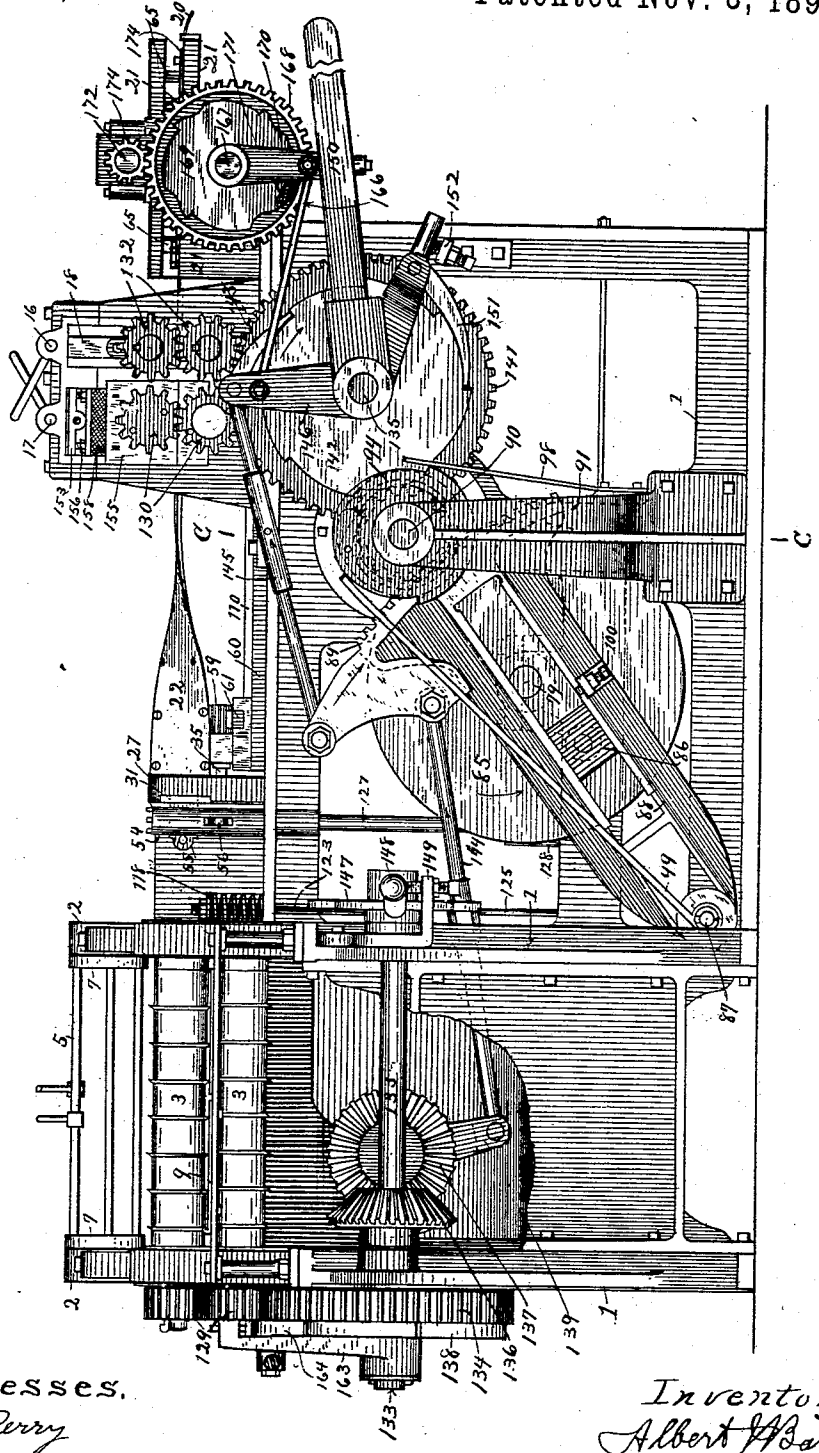

Fig. 3.

Witnesses.
J. C. Perry
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Inventor.
Albert J. Bates.

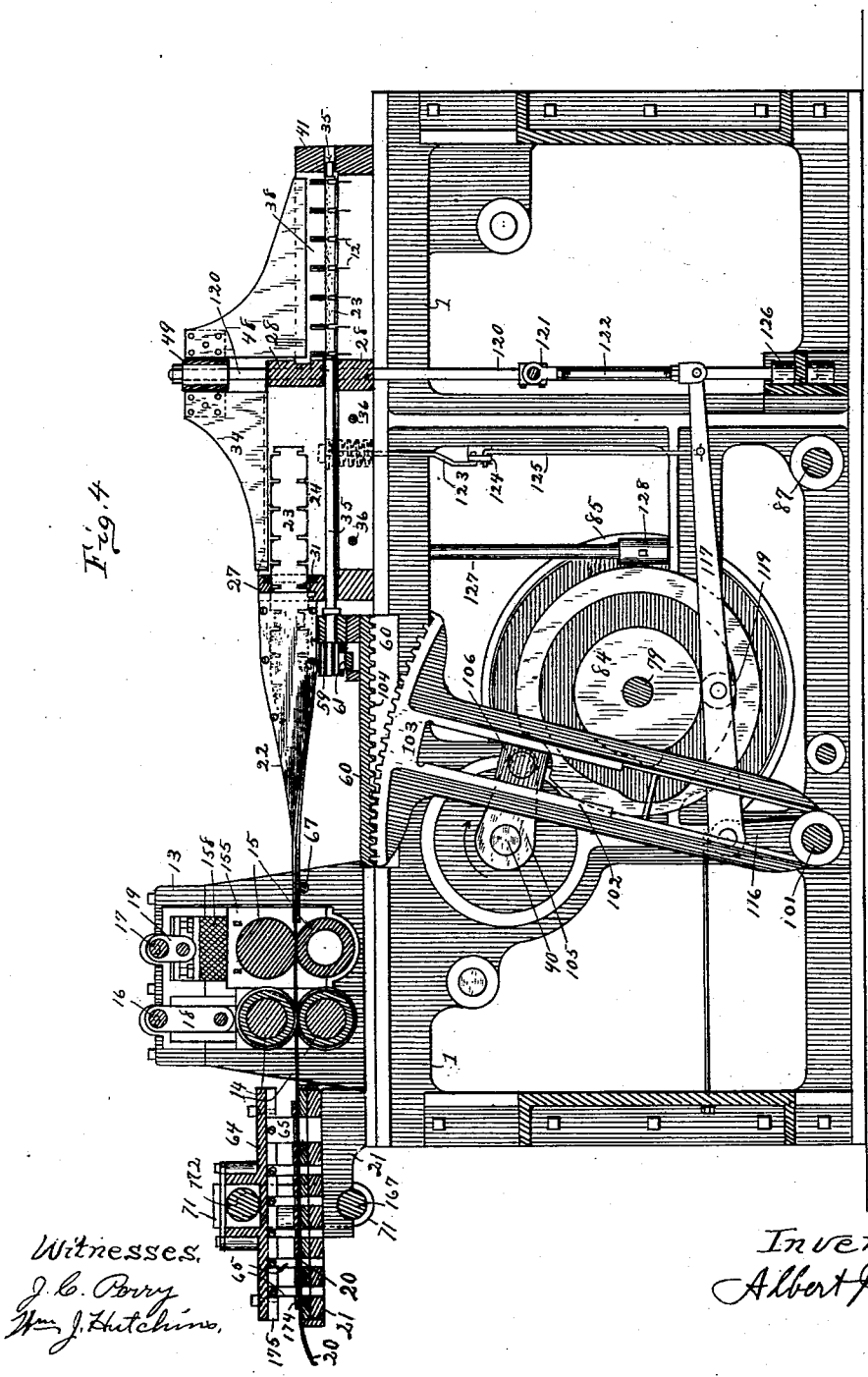
(No Model.) 13 Sheets—Sheet 4.

A. J. BATES.

CELL CASE MACHINE.

No. 570,621. Patented Nov. 3, 1896.

Fig. 4



Witnesses,
J. C. Berry
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(No Model.) 13 Sheets—Sheet 5.

A. J. BATES.

CELL CASE MACHINE.

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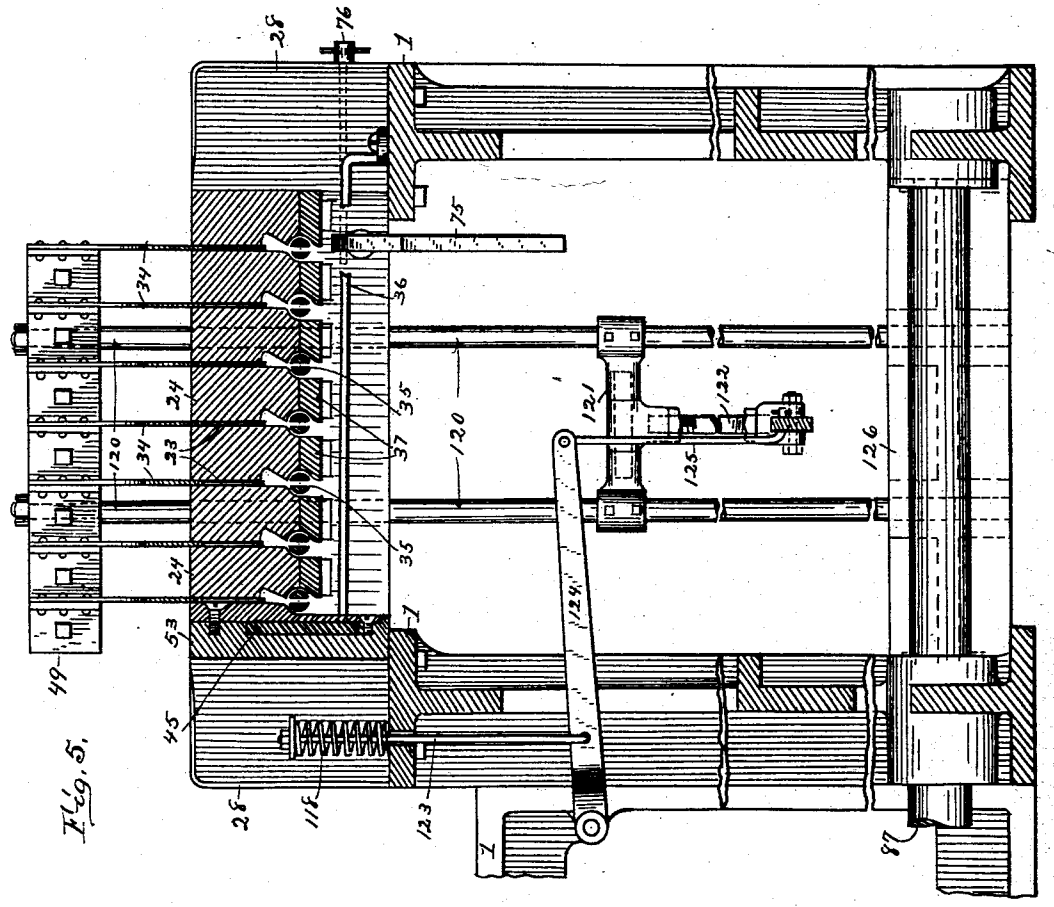

Fig. 5.

Witnesses,
J. C. Perry
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(No Model.) 13 Sheets—Sheet 6.

A. J. BATES.

CELL CASE MACHINE.

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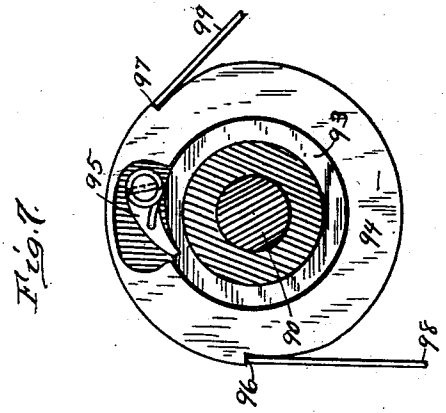

Fig. 7.

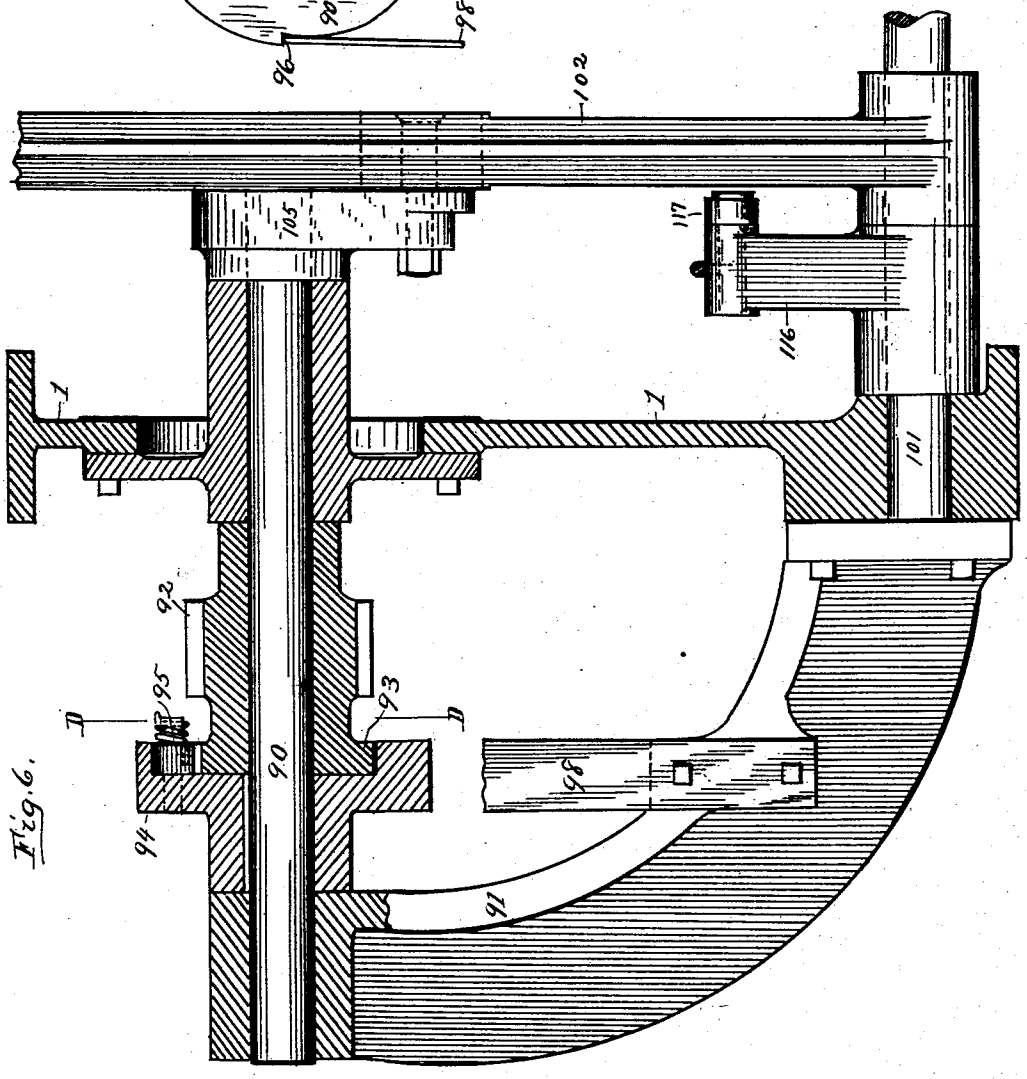

Fig. 6.

Witnesses.
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(No Model.) 13 Sheets—Sheet 7.

A. J. BATES.

CELL CASE MACHINE.

No. 570,621 Patented Nov. 3, 1896.

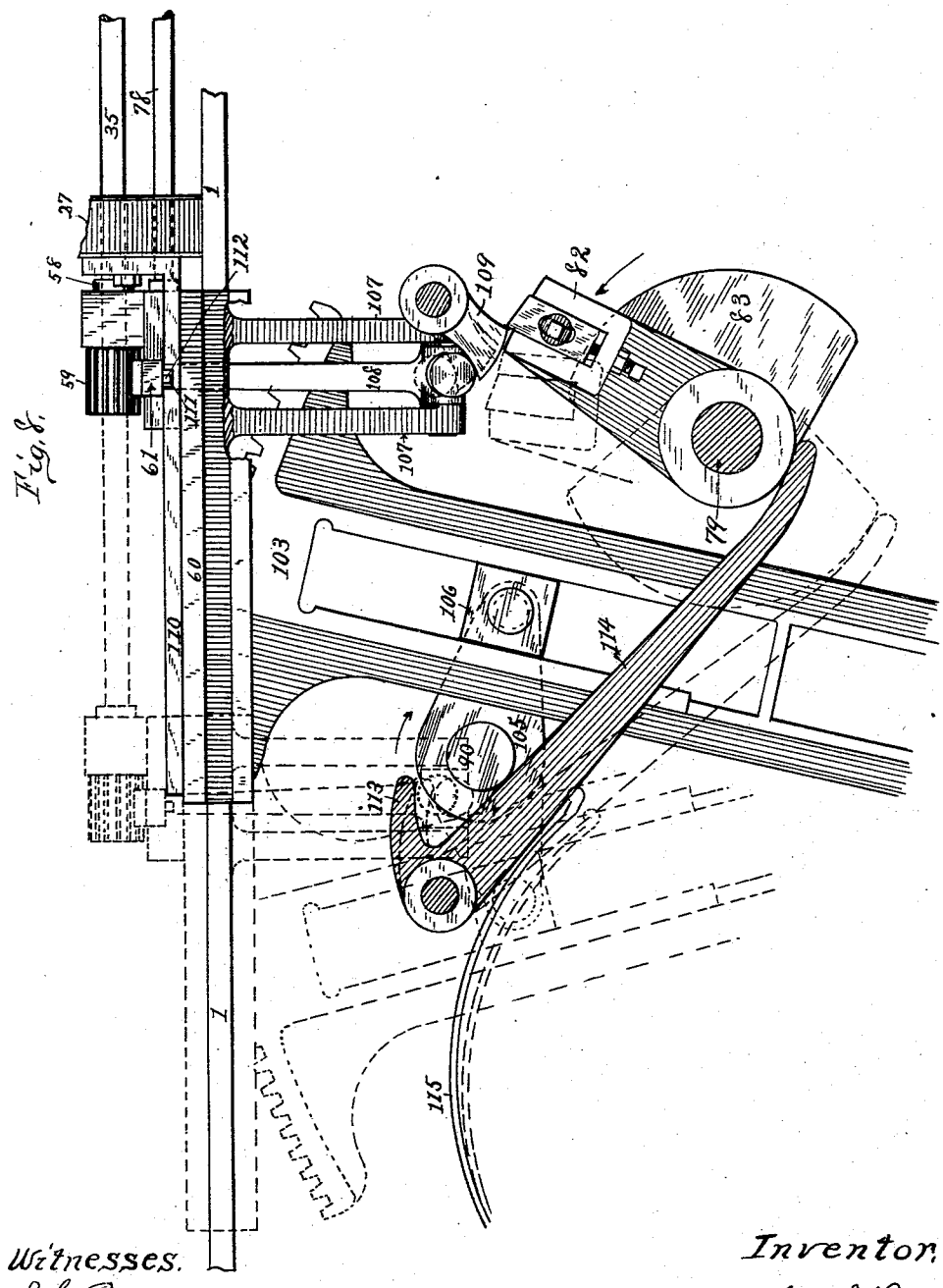

Fig. 8.

Witnesses.
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Inventor.
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(No Model.) 13 Sheets—Sheet 8.

A. J. BATES.

CELL CASE MACHINE.

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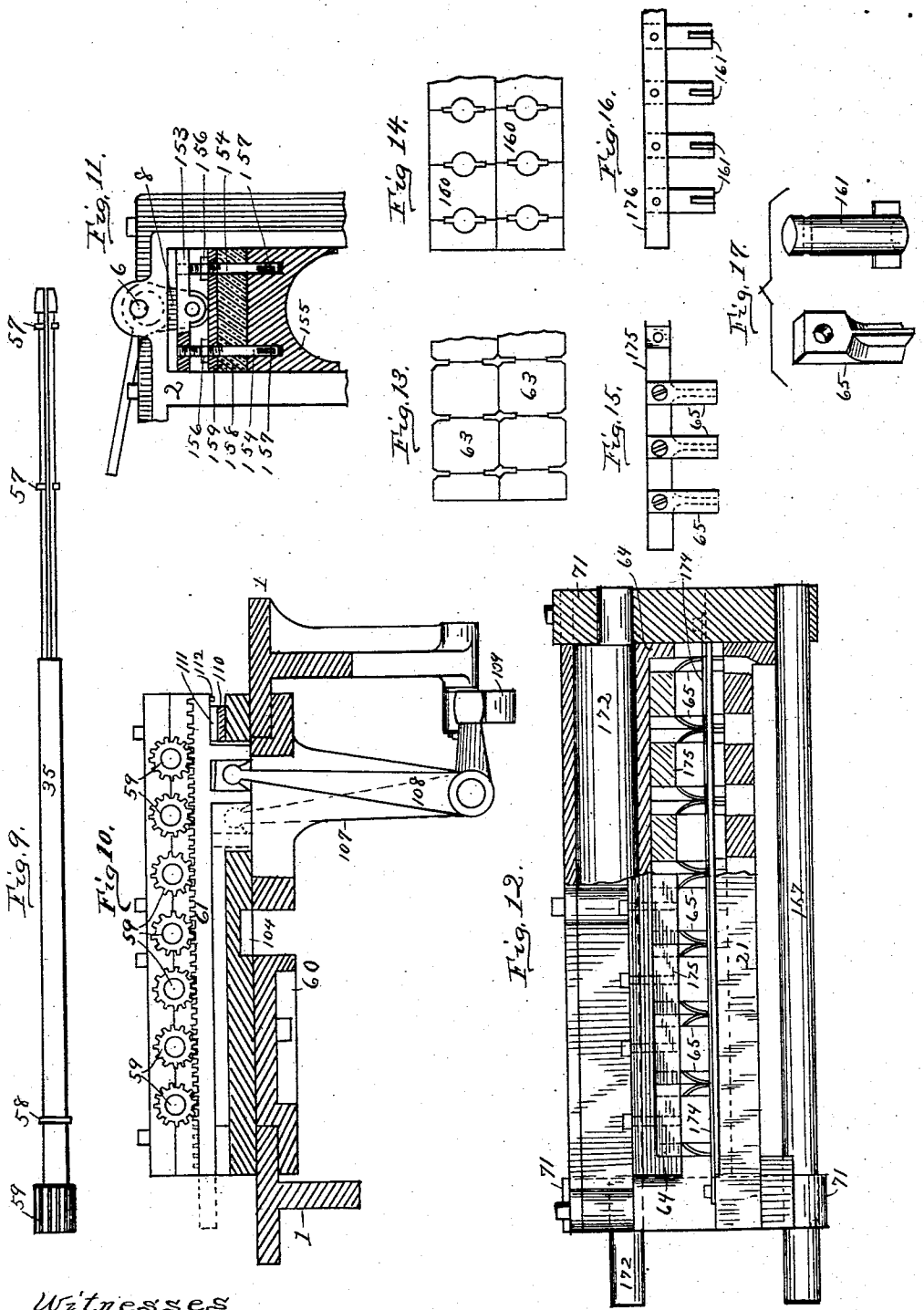

Witnesses
J. C. Perry
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Inventor
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(No Model.) 13 Sheets—Sheet 9.

A. J. BATES.

CELL CASE MACHINE.

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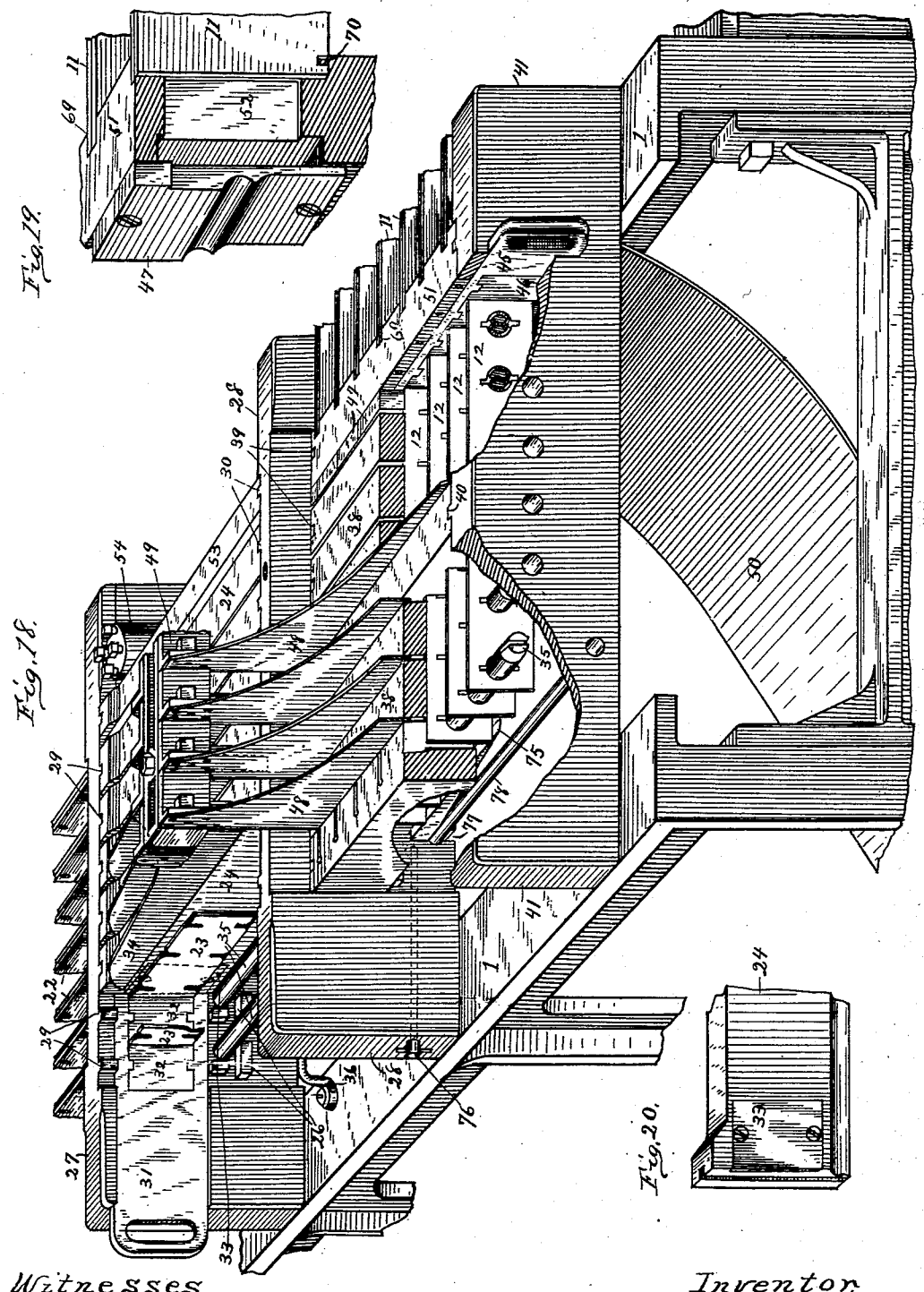

Fig. 19.

Fig. 18.

Fig. 20.

Witnesses.
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(No Model.) 13 Sheets—Sheet 10.

A. J. BATES.

CELL CASE MACHINE.

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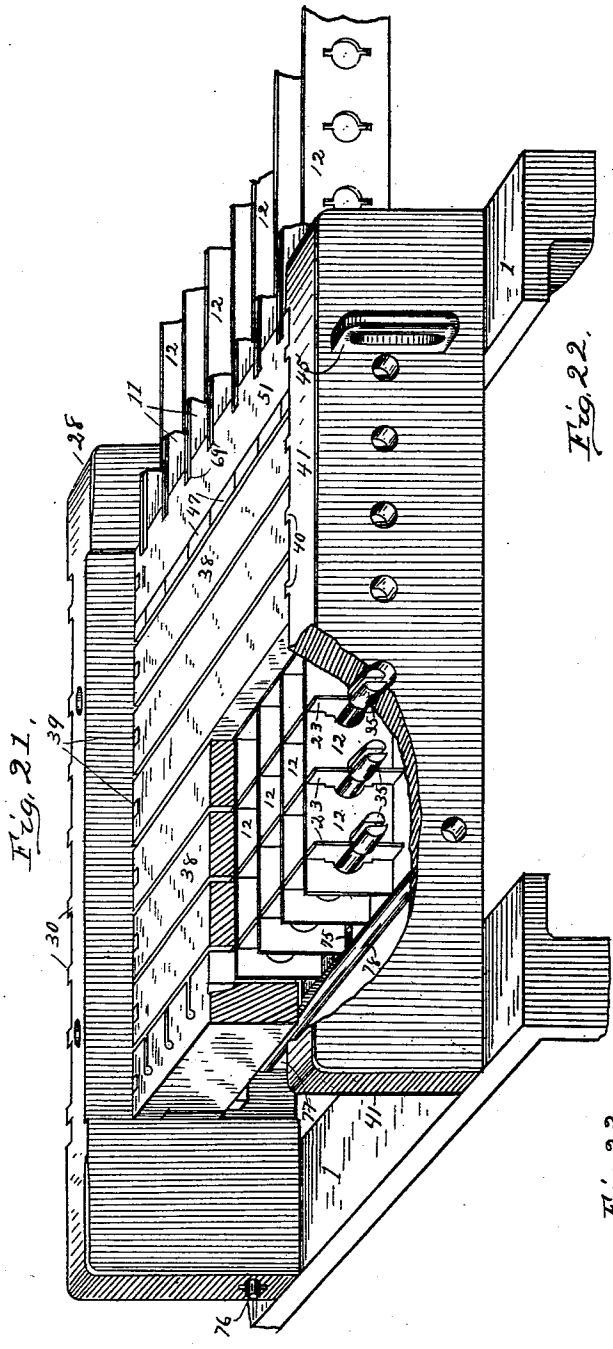

Fig. 21.

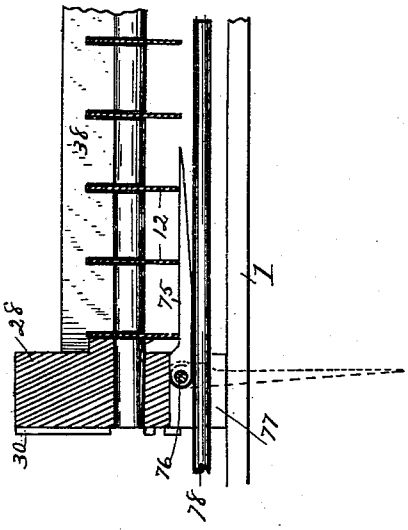

Fig. 22.

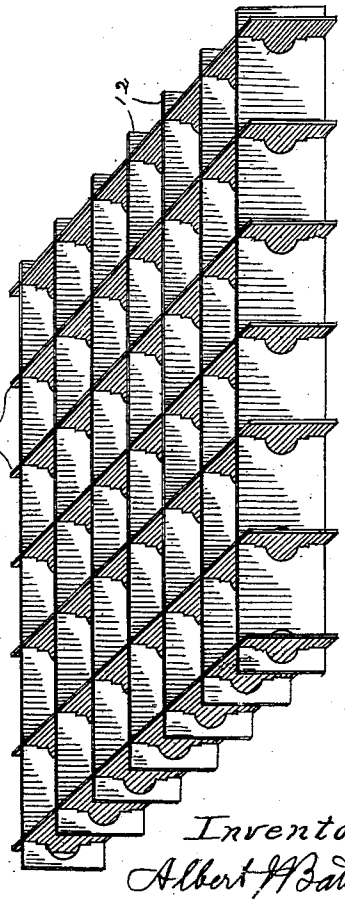

Fig. 23.

Witnesses.
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(No Model.) 13 Sheets—Sheet 11.

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CELL CASE MACHINE.

No. 570,621. Patented Nov. 3, 1896.

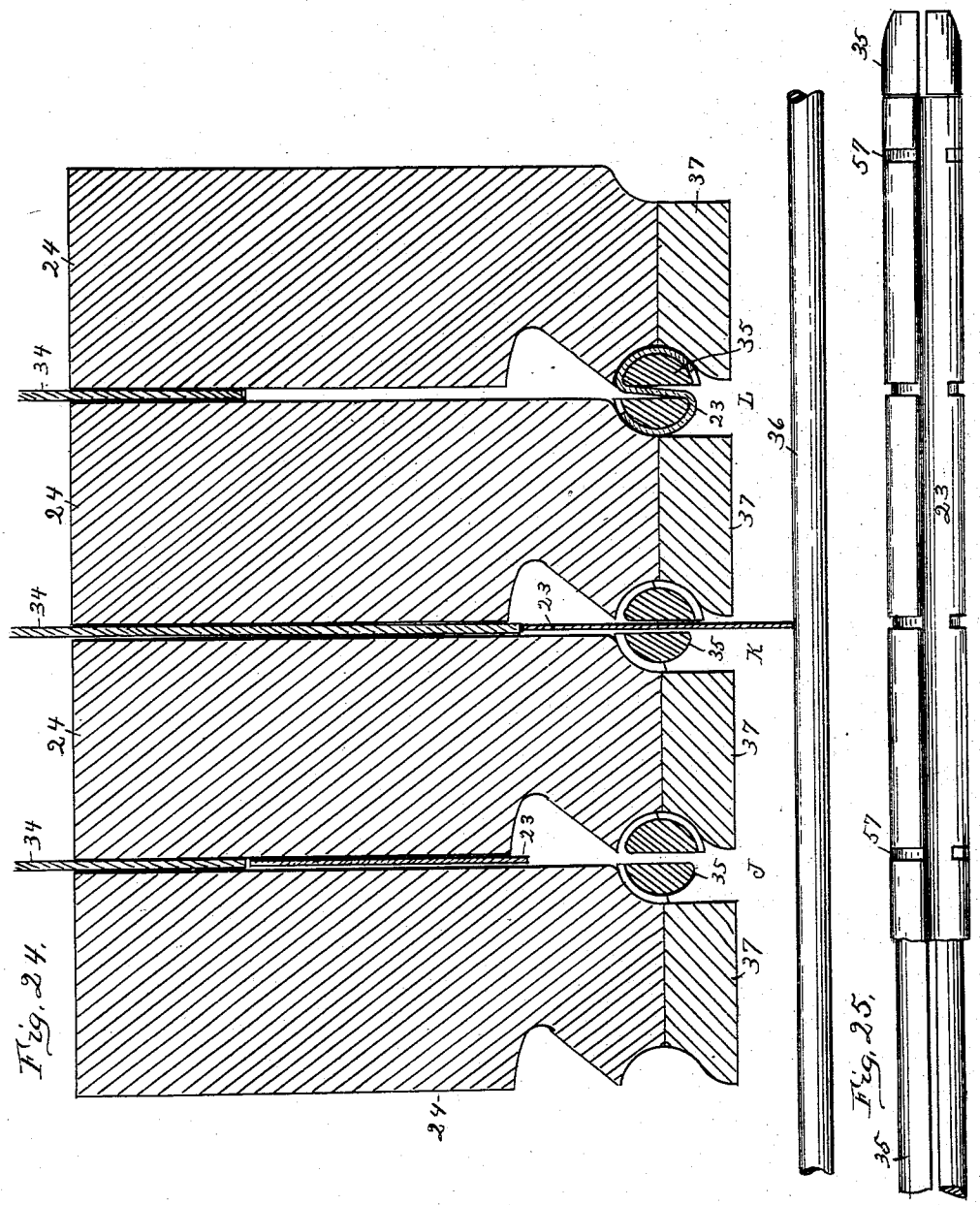

Fig. 24.

Fig. 25.

Witnesses,
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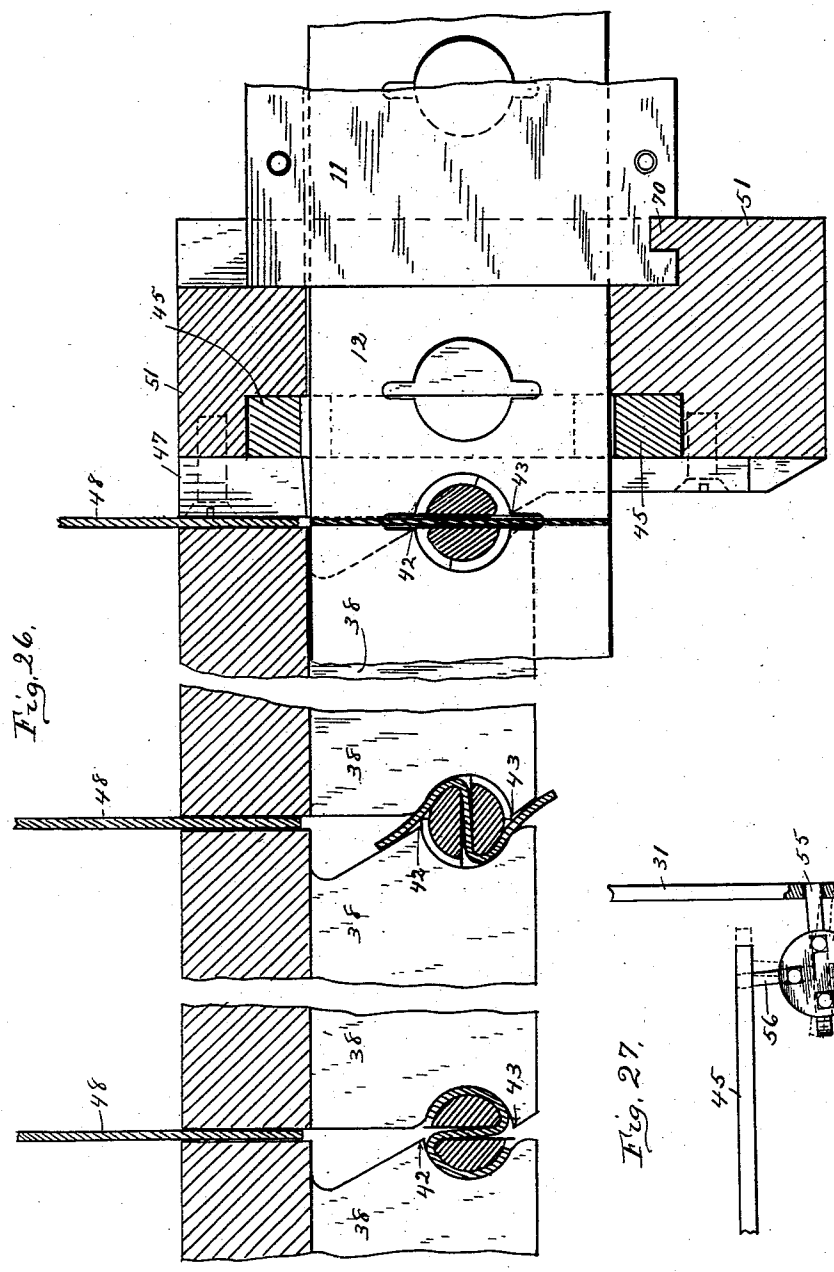
Albert J. Bates

(No Model.) 13 Sheets—Sheet 12.

A. J. BATES.

CELL CASE MACHINE.

No. 570,621. Patented Nov. 3, 1896.



Witnesses,
J. C. Perry
Wm. J. Hutchins.

Inventor.
Albert J. Bates.

(No Model.) 13 Sheets—Sheet 13.

A. J. BATES.

CELL CASE MACHINE.

No. 570,621. Patented Nov. 3, 1896.

Fig. 28.

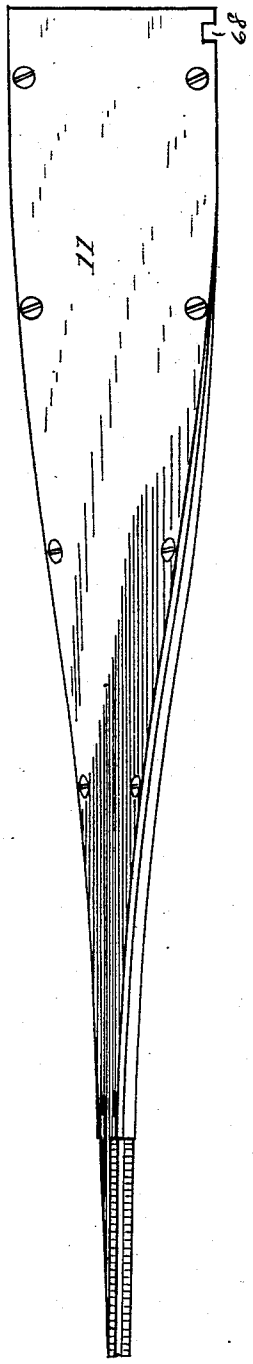


Fig. 29.

Fig. 32.

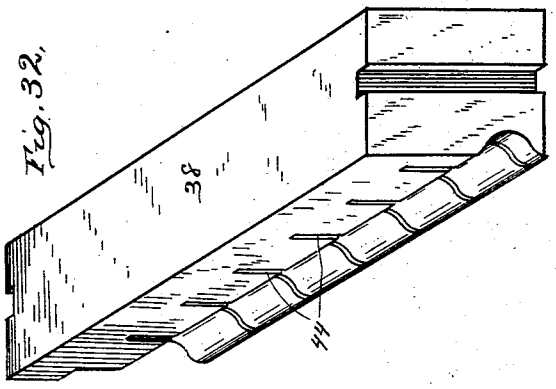


Fig. 30.

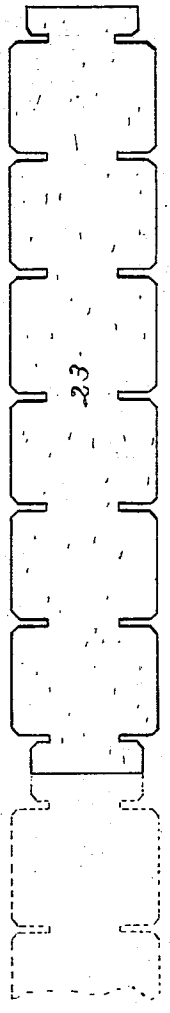
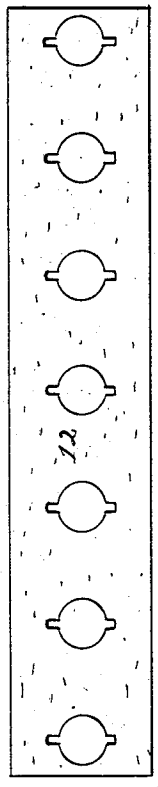


Fig. 31.



Witnesses.
J. B. Perry.
Wm. J. Hutchins

Inventor.
Albert J. Bates

UNITED STATES PATENT OFFICE.

ALBERT J. BATES, OF JOLIET, ILLINOIS.

CELL-CASE MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,621, dated November 3, 1896.

Application filed February 8, 1893. Serial No. 578,469. (No model.)

To all whom it may concern:

Be it known that I, ALBERT J. BATES, a citizen of the United States of America, residing at Joliet, in the county of Will and State of Illinois, have invented certain new and useful Improvements in Cell-Case Machines, of which the following is a specification.

My invention relates to machines for manufacturing egg or cell cases, consisting usually of two series of crossing strips of strawboard, paper-board, or other like material.

The object of my invention is to provide an automatic machine of a simple, efficient, and durable construction for manufacturing a particular kind of such egg or cell cases, wherein one series or set of the strawboard strips are provided with a series of central holes or openings through which the other series or set of strawboard strips are inserted while in a rolled or folded form and then unrolled or unfolded, so that both sets of strips will stand in vertical planes at right angles to each other, and the one set be inserted through the other at the crossings or intersections of the strips and thus securely locked together, one set of strips being thus "threaded," so to speak, upon the other set, and by means of which such cell-cases may be rapidly and cheaply manufactured from continuous rolls or webs of strawboard, paper-board, or other like material.

To this end my invention consists, primarily, in the combination with a holder or device, or series of holders or devices, for holding one or all of one set or series of the strips, (which for convenience I will designate as the "cross" or "transverse" series of strips, the same being the series having the central perforations,) of a device or series of devices for holding one or all of the other set of strips (which for convenience I will call the "longitudinal" set of strips) in a rolled or folded form about their longitudinal axes and guiding the longitudinal set through the central holes or openings of the transverse set when the one set are moved toward the other for the purpose of inserting the longitudinal strips through the openings in the transverse strips, or threading the transverse strips upon the longitudinal strips, the holder or holders for one set or series of said strips being movable in respect to the other for the purpose of inserting the one set of strips through the other. Preferably one transverse holder or holding device is employed for each of the transverse strips composing the cell-case, and one longitudinal holder for each of the longitudinal strips, so that each and all of the one set of strips may be inserted into or threaded upon the other set of strips simultaneously or by one and the same movement, as by this means the capacity of the machine may be greatly increased over what it would be if, for example, but a single longitudinal holder were employed and the longitudinal strips inserted one by one through the central holes or perforations of the transverse strips, or what it would be if, for example, but a single transverse holder were employed and the transverse strips threaded upon the longitudinal strips one by one. I prefer to mount the transverse strip-holders on the stationary frame of the machine and to impart the necessary reciprocating movement to the longitudinal holders. Each of the transverse set or series of strip-holders consists, preferably, of a simple guide, slot, or way, equal in width to the thickness of the straw or paper board of which the transverse strip is formed, the walls of such guide, slot, or way being preferably formed in a suitable block or blocks, and the walls of such guide, slot, or way being preferably substantially continuous in order to insure the proper registry of the longitudinal strips with the transverse strips when the former are inserted through the latter. Each of the holders or devices for holding the longitudinal strip in a rolled or folded form about its longitudinal axis consists, preferably, of a slotted shaft or spindle, by the rotation of which in a suitable chamber or guideway the longitudinal strip may be rolled or folded about its longitudinal axis to adapt it to be inserted through the holes or openings in the transverse strips and then unrolled or unfolded by the reverse rotation of such slotted shaft or spindle. The guideway or walls of the chamber which, in connection with the slotted shaft or spindle, serves to hold the longitudinal strip in a rolled or folded form while being inserted through the holes or openings in the transverse strips is preferably not made movable

or reciprocating with the slotted shaft or spindle, and is preferably formed in or by the same block or blocks in which the transverse strip-holder slots or guides are formed, the reciprocating movement of the slotted shaft or spindle serving to convey the longitudinal strip through such chamber or guideway and into accurate registry with the transverse strips.

A further feature of my invention consists, in connection with the transverse holders, guides, or slots for the transverse strips and the longitudinal chambers or guides into which the longitudinal strips are conveyed by the slotted shafts or spindles, in making such transverse holders or guides and such longitudinal chambers or guides bottomless, or, in other words, in providing both and all with discharge-passages corresponding in shape to the finished cell-case, so that the finished cell-case may be ejected from said holders or guides, and also, in combination therewith, of ejector-blades reciprocating at right angles to the plane of the finished cell-case.

It also consists in the combination, with the transverse strip-holder and the longitudinal strip-holder, of a device for feeding or conveying the longitudinal strip into the longitudinal holder preparatory to its being rolled or folded thereby to enable it to be inserted through the holes or perforations in the transverse strips.

It also consists in the combination, with two beds or tables arranged at right angles to each other, and along which the two continuous webs of strawboard or paper are fed, of suitable devices for punching or cutting the required holes, slits, or notches in the longitudinal and transverse strips, and for dividing the wide webs of strawboard or paper in the direction of the length of the webs into strips of the required width, in connection with suitable guides or devices for turning or twisting each of the two sets of strips a quarter-turn, so that both sets of strips will stand in vertical planes, and for spacing the strips or bringing them to the required distance apart to properly enter the holders or devices by which the one set is inserted through the holes or openings in the other.

It also consists in the combination, with a device for feeding forward a continuous web of strawboard or paper, of devices for forming and dividing such web into a series of transverse cell-strips having central holes or openings, a series of transverse strip-holders or devices for holding the transverse strips, guides or devices for causing the transverse strips to enter the transverse holders, a device for feeding forward a second web of strawboard or paper to form the longitudinal strips, devices for forming and dividing such second web into a series of longitudinal cell-strips, a series of devices for rolling or folding said longitudinal cell-strips about their longitudinal axes to adapt the same to enter the holes or openings in the transverse strips and inserting them through such holes or perforations.

It also consists in the combination, with a slotted spindle or shaft about which the longitudinal cell-strip may be rolled or folded, of a chamber or guideway surrounding said shaft or spindle by which the longitudinal strip is held in its rolled or folded form while being conveyed through the holes or openings in the transverse strips by the longitudinal or reciprocating movement of said slotted shaft or spindle.

It also consists in the combination, with a slotted shaft or spindle about which the longitudinal strip is rolled or folded, of a guideway or chamber surrounding such spindle, and a guideway communicating therewith through which the longitudinal strip may be inserted into the slot of the shaft or spindle preparatory to the rolling or folding of the strip about the spindle, and to its being fed forward through such chamber or guideway into and through the holes or openings in the transverse strips.

It also consists in the combination, with such slotted shaft or spindle, of a device for pushing or feeding the longitudinal strip into the slot of such shaft or spindle; and it also consists in the novel construction of parts and devices and in the novel combinations of parts and devices herein shown and described, and specified in the claims.

In the accompanying drawings, forming a part of this specification, I have illustrated one particular form of machine or mechanism for reducing my invention to practice, and that which I believe to be the best form now known to me for embodying it. It will, however, be understood by those skilled in the art that the essential principle and mode of operation of my invention may be embodied in machines of greatly-modified constructions; but the nature and principle of my invention will be readily understood by those skilled in the art from the construction of the one particular machine which I have illustrated in the drawings, and which I will now proceed to describe in detail in connection with the drawings and the reference-letters and numerals thereon.

In the drawings similar letters and numerals of reference indicate like parts throughout all the figures.

In said drawings, Figure 1 is a top plan of the machine. Fig. 2 is a front side elevation of the same. Fig. 3 is a rear side elevation of the same. Fig. 4 is a sectional elevation of the same on line A A of Fig. 1. Fig. 5 is a cross-sectional elevation of the machine on line B B of Fig. 1, looking toward the right and having the wing of the machine shown at the upper part of the view in Fig. 1 broken away; Fig. 6, a cross-sectional elevation of portions of one side of the machine, taken on line C C, Figs. 1, 2, and 3, also showing in full lines parts of the machine located at said

junction; Fig. 7, a detailed sectional view taken through line D D, Fig. 6, looking toward the left; Fig. 8, a detailed side view of mechanism of the machine for reciprocating a sliding carriage and for actuating a sliding rack and pinions mounted on said carriage; Fig. 9, a top view of one of the cell-strip-wrapping shafts of the machine; Fig. 10, a cross-sectional view of the upper portion of the machine on line E E of Fig. 1, looking toward the right, showing only the immediate parts; Fig. 11, a detailed side view of a portion of one of the roll-housings of the machine and a sectional view of portions of the roll-adjusting mechanism thereof; Fig. 12, a detailed end view of one of the die-tables and punch-head of the machine, having portions shown in section to more clearly show the dies and punches thereof; Fig. 13, a detailed plan of a portion of the machine-dies used for side-notching the cell-strips; Fig. 14, a similar view of a portion of the machine-dies used for perforating the cell-strips; Fig. 15, a side view of a portion of the punches and their supporting-bar for operating in conjunction with the dies for side-notching the cell-strips; Fig. 16, a similar view of a portion of the punches and their supporting-bar for operating in conjunction with the dies for perforating the cell-strips; Fig. 17, a detailed perspective of one of each of said punches; Fig. 18, a detailed perspective of that portion of the machine where the case-cells are formed, showing portions of the machine parts broken away and in section to more clearly present construction and the manner in which the case-cells are formed; Fig. 19, a detailed perspective of a portion of one cutter-bar guideway of the machine, of a shear-block attached thereto, and of portions of cell-strip guides connected therewith, the same being a portion of the structure shown to the right in Fig. 18; Fig. 20, a detailed perspective of one end portion of one of the primary cell-strip guide-blocks of the machine, showing a shear-plate attached thereto, the same being a portion of the structure shown at the upper part of the view in said Fig. 18; Fig. 21, a detailed perspective of a portion of the structure represented in Fig. 18, showing an advanced stage of formation of the case-cells; Fig. 22, a detailed sectional view of a portion of the machine at a junction where the ends of the perforated cell-strips are delivered into the cell-forming compartment, a side view of a pivoted arm for supporting the ends of certain ones of said strips, and of a traveling rod for actuating said arm; Fig. 23, a perspective view of finished cells, the same being the product of the machine; Fig. 24, a detailed cross-sectional view of adjacent side portions of the primary cell-strip guide-blocks of the machine and of the strip-wrapping shafts and strip-delivering blades, representing in section the principal positions of the cell-strips while they are retained between said blocks; Fig. 25, a view of one end portion of one of the cell-strip-wrapping shafts of the machine and of a portion of a cell-strip wrapped thereon; Fig. 26, a detailed sectional view of adjacent side portions of the cell-strip guide-blocks constituting the cell-forming compartment of the machine, of the strip-wrapping shafts, of a strip-guideway leading to said compartments, of the cell-strip cutter-bar, and of a portion of a perforated strip in said guideway, representing the position of the wrapped strips and of the different stages of unwrapping of the same while in said compartment; Fig. 27, a detailed plan of the intermittent oscillating head for actuating the cell-strip cutter-bars of the machine and of portions of said cutter-bars; Fig. 28, a side view of one of the spiral cell-strip guides of the machine; Fig. 29, a cross-sectional view of the same; Fig. 30, a side view of one of the notched cell-strips; Fig. 31, a similar view of one of the perforated cell-strips, and Fig. 32 a detailed perspective of one of the guide-blocks of the cell-forming compartment of the machine.

My invention relates to a machine for making paper cells used as fillers in shipping-cases, which cells are formed by interlocking two series of strips, which series are at right angle to each other and placed with their side walls vertical, and wherein the said series of strips are respectively sheared from single broad strips of paper and individually and automatically shaped and fed forward into a cell-forming compartment in such manner that they are interlocked, severed from the infeeding strip portions, and discharged from the machine; and it consists in the construction of a compartment-machine wherein at two compartments the broad strips of paper from which the cell-strips are formed are punched so that side notches will be formed in one set of the strips, and so that perforations will be formed in the opposite set of strips, and wherein at said compartments the two series of cell-strips are respectively sheared from said broad strips of punched paper and fed forward, one series direct into a compartment where the cells are formed and one series to a primary compartment where suitable lengths are severed from the infeeding strips, delivered to wrapping-shafts, which wrap them thereabout and thereafter feed them forward into the cell-forming compartment in their wrapped form through perforations of the former infed strips, where they are unwrapped, thus interlocking them with said perforated strips, the wrapping-shafts withdrawn, the former infed perforated strips severed at their entrance to said compartment, and the cells thus formed ejected from said compartment; and it further consists in the special construction and arrangement of certain parts of the machine structure and in certain special combinations of parts, which improvements are fully set forth and explained in the following specification and pointed out in the claims.

Referring to the drawings, 1 represents the frame of the machine, and by special reference to Fig. 1, F represents a compartment of the machine for punching, shearing, and feeding forward the perforated cell-strips, and comprises a table 9, supporting thereon a plurality of dies 160, as shown at Fig. 14, a corresponding number of punches 161, as shown in Figs. 16 and 17, which are supported by a vertically-operative head 62 and operated to work in conjunction with said dies, a pair of roll-housings 2, fixed upon the frame, a pair of paper-strip-shearing rolls 3, and a pair of feed-rolls 4, which rolls are suitably boxed in said housings, as shown, the upper ones of said rolls having their boxes connected with eccentric cross-rods 5 and 6, respectively, through the agency of respective links 7 and 8, as a means of vertically adjusting them, by turning said rods by operating their hand-levers, geared mechanism for intermittently operating said punches and rotating said rolls, which will be hereinafter described, and a series of spiral guides 11 for conducting the strips 12 (which are sheared from the broad strip and perforated centrally at intervals, as shown) from said rolls to the cell-forming compartment of the machine.

G represents a second similar compartment of the machine for punching, shearing, and feeding forward the side-notched cell-strips and comprises a similar die-table 21, supporting thereon a plurality of dies 63, as shown in detail in Fig. 13, a corresponding number of punches 65, as shown in Figs. 15 and 17, which are supported by a vertically-operative head 64 and operated to work in conjunction with said dies, like housings 13, like shear-rolls 14, like feed-rolls 15, which pairs of rolls are likewise suitably boxed and in like manner adjusted by means of cross eccentric rods 16 and 17, and connecting-links 18 and 19, geared mechanism for intermittently operating said punches and rotating said rolls, which will also be hereinafter described, and a series of spiral guides 22 for conducting the strips 23 (which are sheared from the broad strip 20 and side-notched at intervals, as shown) from said rolls to the primary cell-strip compartment of the machine.

H represents the said primary cell-strip compartment, and comprises a series of horizontally-arranged parallel blocks 24, each having vertical recesses, as shown, and supported at each end by being removably seated upon side-bracket lugs 26 (see Fig. 18) of the cross-beams 27 and 28 and held a little distance apart from each other by means of tongues 29 and 30, respectively, of beams 27 28, extending into their end recesses, as shown, so as to form guideways between them to receive and contain the side-notched cell-strips 23 as they are intermittently fed forward from the guides 22 through corresponding openings through beam 27. (See Figs. 4 and 18.) A cutter-bar 31, set with cutter-sections 32, is placed in a horizontal side recess of beam 27, so constructed that the cutter-sections 32 are a little distance apart, leaving strip passage-ways between them, which ways register with the spaces between blocks 24, and when said bar is actuated its cutter-sections will move to shear with shear-plates 33, fixed to the side of blocks 24, as shown in Figs. 18 and 20, to sever the infed portions of strips 23 at said shear junctions; strip-delivering blades 34, arranged to be operated vertically and intermittently between the blocks 24 to engage and force down the severed strips 23 from their infed position (shown in section at J in Fig. 24) to and into the slots of the wrapping-shafts 35, which operate in ways formed in the lower side portions of blocks 24, as shown at K in said Fig. 24, being prevented from dropping down too far by means of cross stop-rods 36, when by a one-half rotation of the said wrapping-shafts the said strips are wrapped about said shafts, where they are confined by the walls of the wrapping-shaft ways, as shown at L in said Fig. 24, and in such wrapped position they are carried by the travel of said wrapping-shafts from said primary compartment through holes in beam 28 and into the cell-forming compartment of the machine. Said blocks 24 are each made with a separable bottom portion 37, separable on a line central with the wrapping-shaft ways, as represented in Fig. 24, so that their upper portion may be lifted from their seat without removing the said wrapping-shafts.

I represents the cell-forming compartment of the machine, and comprises a series of horizontally-arranged parallel blocks 38, constructed and seated similar to blocks 24, and held so the spaces between them will be in exact line with those of said blocks 24 by means of the tongues 39 40, respectively, of cross-beams 28 and 41, between which they are seated, and also provided with wrapping-shaft ways, similar to and in exact line with those of said blocks 24, so that strips 23, while wrapped about the said wrapping-shafts 35, may be delivered to within said compartment I and there confined in their wrapped position until the action of said shafts unwraps them, which is done by a reverse one-half rotation of said shafts, causing the strip edges to be caught, owing to their tendency to spring off from said shafts, by the stripper edges 42 and 43 (a stripper for each strip edge) and thus stripped from their said wrapping-shafts, and caused, by reason of the special cross-sectional form of the spaces between the blocks 38, as shown, to be unwrapped within said spaces and presented therein with their sides vertical, which operation is illustrated in section in Fig. 26, wherein the three principal stages of operation are shown. The blocks 38 are further made with bottom cross-vertical slits, (shown at 44 in Fig. 32, and represented in Figs. 4, 18 to 21, and 26, and represented by dotted lines in Fig. 1,) which slits form strip-guideways across said compartment I, and

into which the perforated cell-strips 12 are fed prior to the carrying forward into said compartment of the strips 23, so their perforations will come to register with the wrapping-shaft ways, thereby causing the incoming wrapped strips 23 to be delivered through the perforations of said strips 12, as represented in Fig. 18, so that when the strips 23 are unwrapped their body parts will be within said perforations and their side notches will register and interlock with strips 12, as represented in Fig. 21, thus interlocking the said two series of strips 12 and 23 and forming the cells, as represented in Fig. 23; and after thus unwrapping the said strips 23 the wrapping-shafts 35 are withdrawn from compartment I to bring their slotted portions again to within the primary compartment H to be in readiness to again receive succeeding strips 23.

The machine is so timed that during the action of the said wrapping-shafts, traveling to and from the cell-forming compartment I, succeeding strips 23 are fed forward to within the primary compartment H, and as the action of severing them from their infeeding portions takes place a second similar cutter-bar 45, having cutter-sections 46, is operated to shear with stationary cutter-blocks 47 at the junction where the perforated cell-strips enter the cell-forming compartment I, (see Fig. 18,) and thereby sever the formed cells from the infeeding-strip portions 12, so the finished cells may be discharged from the machine, which discharging is done by a down movement of a series of blades 48, which operate between the blocks 38, as shown especially in Fig. 18, and which are fixed to a common head 49 with said primary compartment-blades 34, and said two series of blades are therefore operated simultaneously, the blades 34 forcing down a set of side-notched strips 23 into the wrapping-shaft slots and the blades 48 forcing down the set of finished cells from said cell-forming compartment, when the said finished set of cells fall upon an inclined chute 50, placed under compartment I, which conducts them from the machine in a finished form, as represented in Fig. 23.

The cutter-bar 45 is seated to operate in a side recess of an end cross-block 51, placed at the entrance to the cell-forming compartment I, (see Figs. 18 and 19,) to which block the cutter-blocks 47 are attached and to which the spiral strip-guides 11 are connected, as shown in Fig. 19, said block being made with cross-openings, as shown at 52, Fig. 19, and represented in Fig. 18, through which the strips 12 are fed from guides 11 to and between the cutters 45 47 and to within their respective guideway-slits across the under portion of blocks 38. Said cutter-bar 45 further extends through an opening of cross-beam 28 and has a portion operating in a way in a side cross-block 53 of the primary compartment H, as represented by dotted lines in Fig. 1 and shown in section in Fig. 5, thus being placed in a near relative position to an intermittent oscillating head, (shown at 54 in Figs. 1, 3, 18, and 27,) which head has secured therein side-extending arms 55 and 56, the arm 55 extending to the end portion of cutter-bar 31 into an opening thereof, as shown in Fig. 27 and represented by dotted lines in Fig. 1, and the arm 56 extending at right angle from said former arm, through an opening of cross-block 53 of primary compartment H, to and into an opening of the end portion of cutter-bar 45, as also represented in Figs. 1 and 27, thereby jointly connecting said cutter-bars, so that at each actuation of head 54, which is imparted thereto, both said cutter-bars will be actuated to shear with their respective shear parts to sever the cell-strips, as described, and again resume their idle position so succeeding cell-strips may be fed forward between their cutters.

The form of the wrapping-shafts 35 is shown in Fig. 9, their slotted end portion, excepting a short end portion, being reduced in diameter, so that the diameter of the strips 23, wrapped thereabout, as represented in Figs. 24, 25, and 26, will be no greater than the remaining portion of the shafts, and therefore be protected and confined during the travel from the primary to the cell-forming compartments of the machine. Said reduced portions are further made with segmental flanges 57, which, when the strips are wrapped thereabout, come within certain of the strip side notches to aid in properly holding the strips in position during their travel from the former to the latter compartments, and during such travel the ends of said shafts, being in part of a diameter sufficient to fill their ways through cross-beam 28 and between blocks 38 of the cell-forming compartment I, properly guide the movement of travel and prevent excessive friction of the strips in said ways, and, further, said shaft ends, when to their full forward movement, enter holes of cross-beam 41. (See Figs. 4 and 21.) In entering said wrapping-shafts to the primary compartment H they are placed through holes in cross-beam 27, as shown in Figs. 4 and 8, and, further, said shafts are each made with an annular flange 58 a distance from the end which extends from beam 27, and with a pinion 59 at said end, and are jointly boxed between said flanges and pinions to a traveling carriage 60, which travels upon flanged ways of the machine-frame, as shown, so that said pinions are brought to mesh with a common cross-toothed rack 61, which is arranged to be operated in a cross-guideway of said carriage, and when operated will jointly rotate said wrapping-shafts sufficient to wrap and unwrap the cell-strips 23. Both pairs of the shear-rolls 3 and 14 of the machine are made with annular shear-flanges, as shown, which are arranged to shear those of one roll with those of the fellow roll in the manner usual with such rolls to longitudinally cut the broad paper strips 10 and 21 into the

series of cell-strips of proper uniform width, as represented, and should the said broad strips contain in their width more than is necessary to make the cell-strips the surplus is sheared off by the outer cutters and discharged to one side of the machine as waste.

The die-table 9 is fixed to frame 1 and supports a set of dies 160, equal in number to the number of perforations in a set of cell-strips 12, which dies are suitably held in proper position upon said table, so as to register with openings through said table for the discharge of the punch-chips, and fixed to each side of said table is a post 66, which form vertical guides for the vertically-operative punch-head 62, and the arrangement of the said punches and dies is such that at the junction of two strip-sections the notches and perforations are closer together than at other portions, which is for the purpose of bringing the two notches and perforations of each strip, which, by infeeding operation, come to rest adjacent the strip severing or cutting-off junction, so the severing of the finished cells will take place midway between said two notches and perforations, so the ends of the said strips of each set of cells will be sufficiently short for proper service in shipping-cases. (See Figs. 23 and 31.)

The spiral guides 11 each comprise two spirally-twisted plates, one of which is grooved to accommodate the passage of the cell-strips 12, (see Figs. 28 and 29,) and the two parts are secured together, one end being reduced to a width corresponding with the width of said strips, so they may be placed side by side upon a cross-rod similar to that shown in section at 67, Fig. 4, which is supported by the roll-housings, and so each of said guides will be in line with the strip it guides. (See Figs. 1 and 4.) The opposite ends of said guides are each made with a notch 68 (see Fig. 28) and are placed in recesses 69 of compartment-block 51, with their notches 68 registering with an upextending portion of said block, as shown at 70, Fig. 19, thus removably seating said guides.

The die-table 21 is likewise fixed to frame 1 and supports a set of dies 63, equal in number to the number of side notches in a set of cell-strips 23, which dies are likewise suitably held in proper position upon said table, so as to register with openings through said table for the discharge of punch-chips, (see Figs. 4 and 12,) and fixed to each side of said table is a post 71, which forms vertical guides for the vertically-operative punch-head 64, and the arrangement of said punches and dies is such as to side-notch the strips 23 to perfectly correspond with the perforated strips 12, so that cells of equal sides will be formed by the interlocking of the two series of strips, and so the ends of cell-strips 23 will be correspondingly short in a finished set of cells.

The spiral guides 22 are of like form and supported at their roll end in like manner as guides 11 and also removably connected with cross-beam 27 in like manner as the guides 11 are connected with compartment-block 51, and the spiral form of each said set of guides being for the purpose of turning the several cell-strips from their horizontal position at the rolls to a vertical and proper position for entering their compartments.

In operation of the machine it is demonstrated that certain of the cell-strips 12, in entering compartment I, have a tendency to come below their proper position at their ends, caused by the diverging position and spiral form of the guides at the inner side of the machine, where the said strips are conducted forward to said compartment I, which diverging position, which is necessary to properly separate the strips so as to be the required distance apart, strains the strips in one side of said spiral guides more than at the opposite side, and hence causes the strips to emerge from said guides slightly curved edgewise, and therefore when the said strips have fully entered said compartment such slightly-curved form will cause their ends to come below their proper relative position in the ways of said compartment, and as a means of holding said strip ends up so their perforations will properly register with the wrapping-shaft ways, a holding-arm 75 is, by means of a pin 76, pivoted in a bottom recess 77 of cross-beam 28, so that when not in service it will hang by gravity, and so a rod 78, connected with and operated by carriage 60, through a hole of the cross-beam 27 and said recess of beam 28, will engage and throw up said arm to a horizontal holding position under said strip ends, as shown.

The fellow spiral guides at the outer side of the machine also slightly curve the strips, which are conducted therethrough edgewise, but in the opposite direction from those at said inner side, and hence are, when entered into said compartment I, held down into proper position by the upper walls of their ways in said compartment, and therefore require no actuated mechanism to bring them down at their end.

The drive-shaft of the machine is represented at 79, supported in boxes in the main body of the machine-frame, and has placed thereon at the machine front a tight drive-pulley 80 and a loose pulley 81, and has fixed thereonbetween the frame sides the latch-arm 82, the peripheral cam 83, and the side-channeled cam 84, and also has fixed on its end, at the rear side of the machine, a combined side-channeled cam and crank-disk 85, which carries on its crank-stud a traveling block 86.

Across the lower part of the machine-frame is boxed a shaft 87, which has placed thereon at its end at the rear side of the machine the arm 88 of a toothed segment 89, which arm is slotted to form a traverse-way for the crank traveling block 86 of disk 85, so that said arm and segment will be operated by the operation of said disk.

90 represents a shaft boxed in the rear side

part of the machine-frame and in the upper end of a bracket-arm 91, (see Fig. 6,) and has sleeved thereon between said bearings a toothed gear-wheel 92, arranged in mesh with segment 89, the hub of which gear is made with a terminal flange 93, having a single ratchet-tooth, as shown in Fig. 7, and placed within the flange of a head 94, which is fixed to shaft 90, and is provided with a spring-pawl 95, arranged to engage said ratchet-tooth, the said pawl being set so a down movement of segment 89 will cause gear 92 to rotate so its hub-flange ratchet-tooth will engage said pawl and thereby cause head 94 and shaft 90 to be rotated, (the said movement being such as to give one complete rotation to shaft 90,) and so an up movement of said segment will cause said gear to rotate idly.

The head 94 is made with two oppositely-facing peripheral offsets 96 and 97, offset 96 being for the registry of a spring-top arm 98, which is attached to bracket-arm 91, and offset 97 being for the registration of a pivoted stop-arm 99, which is pivoted to the end of shaft 87 adjacent at the side of segment-arm 88, and when the head 94 has rotated its full rotation it will be brought to a position (shown in detail in Fig. 7) where the two arms 98 99 will register with their respective offsets 96 97 and thus lock the shaft 90 against further movement, when a stop 100 of said arm 89 will engage under pivoted arm 99 and lift it from the offset of head 94, and a partial down movement of segment-arm 88 will be made and thus start head 94 on its succeeding rotation by the action of the segment 89, the gear 92, and the pawl-and-ratchet mechanism before said stop permits said arm 99 to lower sufficiently to again engage the head 94.

In Fig. 3 the segment 89 is represented as on its down movement and the head 94 as about one-half way about during its rotation. 101 represents a shaft boxed to and supported across the lower part of the machine-frame and has placed thereon a segment-arm 102, having a toothed segment 103, placed in mesh with a toothed rack 104 of the machine sliding carriage 60, (see Fig. 4,) and said segment-arm is further provided with a traverse-way, as shown. Fixed on the inner end of shaft 90 at the side of said segment-arm is a crank 105, having a traverse-block 106, placed to operate in said arm-traverse way, so the movement of said crank will operate said segment-arm and segment and thus reciprocate said carriage 60, which reciprocation is intermittent, owing to the fact that crank 105 is idle during each one-half rotation of the machine, and in said Fig. 4 said crank is represented as making its revolution and at a position about one-half way around. Therefore the carriage 60 is given a forward-and-back movement during said one-half rotation of the machine, and during that time the wrapping-shafts deliver the wrapped cell-strips 23 from compartment H to compartment I, unwrap said strips, and withdraw to said former compartment H, and during the remaining one-half rotation of the machine the said carriage holds said wrapping-shafts in compartment H so succeeding strips 23 are then forced down into their slots, the rack 61 actuated to operate the wrapping-shaft pinions 59, and thus wrap the said strips ready to be delivered to the cell-forming compartment I, as stated. Depending from carriage 60 are arms 107, which carry a bell-crank lever 108, which connects with rack 61 at its upper end so as to reciprocate said rack, and is at its lower side-extending end in line with an arm 109, which is pivoted to the inner side of the machine-frame, and which arm 109 is also in line with and adapted to be engaged by the latch-arm 82 of drive-shaft 79, and when carriage 60 is forward and the wrapping-shafts are within the cell-forming compartment I, which time is at the one-half turn of crank 105, as shown in Fig. 4, latch-arm 82 engages pivoted arm 109 and throws said arm 109 up, which engages against the side-extending portion of bell-crank lever 108 and operates said lever to actuate the rack 61 and thus operate the wrapping-shaft pinions 59 and wrapping-shafts to unwrap the cell-strips within the cell-forming compartment. Said unwrapping operation is performed in a very small fraction of the revolution of the machine, which becomes necessary, as the same must be performed during the time the said wrapping-shafts are at a stand within the cell-forming compartment, which is only at the time the crank 105 is passing the dead-center point in the traverse-way of segment-arm 102, and by reference to Fig. 8 it will be observed that at such required operation the bell-crank lever 108 is in close proximity to pivoted arm 109, and at that time latch-arm 82 engages arm 109, and during a small fraction of the rotation of said latch-arm it engages and throws up said arm 109, which in turn throws up the lower branch of said bell-crank lever and thus actuates the toothed rack 61 one way, and as a means of preventing said rack from being actuated at other times a bar 110 is attached to cross-beam 27 in such manner as to extend horizontally over one side of carriage 60 and under one end portion of said rack, (see Figs. 1, 8, and 10,) and is provided with a cross-recess 111 in its upper side at the junction where said described actuation of said rack takes place, and said rack is provided with a depending pin 112, which at other position of said rack (except at the free end of said bar) extends down at the side of said bar and prevents movement of said rack during the travel in either direction of head 60, but at such point of movement passes through said bar-recess to the opposite side of said bar.

When carriage 60 has been moved back its full reverse limit to withdraw wrapper-shafts 35 from the cell-forming compartment I to the primary compartment H, the bell-crank

lever 108 is carried back therewith, so that its side-extending portion comes under a hook 113 of a lever 114, which is pivoted to the inner side of the machine-frame in line with the pivoted arm 109, (see Figs. 1 and 8 and note dotted lines of Fig. 8,) the lower end of said lever being yieldingly held in peripheral contact with the cam 83 of drive-shaft 79 by means of a spring-arm 115, as shown, the form of said cam being such that when said bell-crank lever has come under lever-hook 113 it will throw lever 114, and thereby cause said hook to move down, and in so doing throw down the said side-extending portion of the bell-crank lever 108, and thus actuate the rack 61 to reversely turn or rotate the wrapper-shafts in primary compartment H to wrap the cell-strips 23, which have been delivered into the shaft-slots. At such point of movement the carriage 60 is back to a station, so that the depending pin 112 of rack 61 is a little beyond the free end of bar 110, which permits the said rack to be thus actuated. Also at such time of movement crank 105, which imparts movement to said carriage, is at a stand, after having made its complete revolution, where it remains during one-half revolution of the machine movement, as before described. Placed on cross-shaft 101 is an upright arm 116, (see Figs. 1, 4, and 6,) which has pivoted thereto a horizontally-extending lever 117, which extends at the side of cam 84 of drive-shaft 79, and has a wrist-roller 119, operating in the channel of said cam, which channel is of such form as to hold said lever from movement during the major portion of the revolution of the cam and to impart a quick down-and-up movement to the said lever during a small portion of said revolution for the purpose of actuating the compartment-blades 34 and 48, as before described, which blades are, through the agency of their common head 49, the down-extending rods 120, the rods cross connecting head 121, and adjustable connecting-rod 122, connected with said lever, as shown in Figs. 4 and 5, and counterbalanced by means of a compression-spring 118, stepped upon one side of the machine-frame, and which is, through the agency of rod 123, lever 124, and rod 125, connected with said blade-actuating lever 117, as fully shown in Fig. 5, wherein the blade-head rods 120 are also represented as passing down through holes of cross-beam 28 and guided at their lower end in holes of a cross-bar 126.

127 represents a vertical shaft boxed near its upper end and stepped at its lower end in the rear side portion of the machine-frame, and has fixed on its upper end the head 54 for actuating the cell-strip cutter-bars, as before described, and fixed on its lower end portion a side-extending arm 128, which operates in the side channel of cam 85 of drive-shaft 79, (see Fig. 2,) which channel is of such form as to hold said arm from movement during the major portion of the revolution of said cam and to impart a quick oscillating movement to said arm during a small portion of said revolution, which is done immediately prior to the movement imparted by cam 84 to operate said blades. Each pair of shear-rolls 3 and 14 are provided with spur-gears fixed on one end thereof, as shown at 129 and 130, respectively, which are placed to closely mesh, and each pair of feed-rolls 4 and 15 are likewise provided with spur-gears 131 and 132, respectively, which also closely mesh, and sleeved on one end of a cross-shaft 133 is a spur gear-wheel 134, arranged in mesh jointly with the lower ones of said gears 129 and 131 for jointly driving said shear-rolls 3 and feed-rolls 4, and placed on stud 135 is a like gear 141, arranged in mesh with the lower ones of said gears 130 and 132 for driving the shear-rolls 14 and feed-rolls 15. Fixed on shaft 133 is a miter-gear 136, arranged in mesh with a fellow gear 137, which is fixed on a shaft 178, (shown in part in Fig. 1, by dotted lines in Fig. 2, and falling in rear of said shaft 133 in Fig. 3,) which shaft has also fixed thereon an arm 139. (See Fig. 1.) Fixed to the side of gear 134 is a ratchet-wheel 138, having four teeth, and fixed on the shaft 133 at the side of said ratchet-wheel is an arm 163, carrying a spring-pawl 164 for engaging said wheel-teeth, and fixed to the side of gear 141 is a ratchet-wheel 142, having eight teeth, and sleeved on the stud 135 at the side of said ratchet-wheel 142 is an arm 146, carrying a spring-pawl 143 for engaging said wheel-teeth and so actuated as to be withdrawn the distance of two teeth at each actuation, and 144 and 145 represent connecting-rods which respectively connect said arms 139 and 146 with the segment-arm 88, as shown in Fig. 3, for the purpose of imparting movement from said segment-arm to the shear and feed rolls through the agency of said pawl-and-ratchet-gear mechanism, and by reason of the said arm 146, placed extending upward, movement imparted to one set of rolls will alternate with that of the opposite set, so that the infeeding of the two series of cell-strips 12 and 13 will be alternative, which is necessary to accommodate the process adapted for constructing the cells; and the said movement is such that a one-fourth revolution is given each of said ratchet-wheels during one complete revolution of the drive-shaft 79, which, owing to the relative proportion of said gears, gives one complete rotation to said set of rolls to shear and feed forward series of strips 12 and 23 of sufficient length to make one set of cells. Said pawl-arms 146 and 163 are respectively provided with connecting-rods 165 and 166, which connect with and impart motion to the operative parts of the said two punch structures, and by reason of the pawls of the arms of said punch mechanism being arranged to engage oppositely from the pawls of arms 146 and 163, which drive the shear and feed rolls, the actuation of said punch mechanism is alternative to that of said shear and feed rolls, thus causing said punches to operate at times

when the infeeding paper, from which the cell-strips are formed, is at a stand.

By reason of the two die-tables 9 and 21 and their punch-heads 62 and 64 and punch-operative mechanism being of like construction a description of one will suffice for both, which is as follows: The posts 71 of table 21 further forms bearing for a bottom cross-shaft 167, (see Fig. 12,) which has fixed on one end a spur gear-wheel 168 and a ratchet-wheel 169, and sleeved thereon an arm 170, which is provided with a spring-pawl 171 for engaging the teeth of said ratchet-wheel, said arm being connected with the connecting-rod 166, so that movement of arm 146 will impart movement to arm 170, and thus through the agency of said ratchet mechanism operate said gear-wheel. Boxed in the upper portion of said posts is a cross eccentric-shaft 172, having fixed on one end a pinion 174, placed in mesh with wheel 168, so that movement of said wheel will rotate said pinion and thus rotate said eccentric-shaft, and by reason of the eccentric portion of said shaft being placed in a cross-box of said punch-head 64 (see Figs. 4 and 12) rotary movement of said shaft will cause said head to be operated, and by further reason of said shaft being rotated one complete revolution at each movement said head will be given one complete down-and-up movement at each actuation of said gear mechanism, thus causing the punches to descend through openings of a stripper-plate 174 and register with the dies to punch the cell-strip paper in the manner described. The said punches and dies vary in construction only so much as becomes necessary to properly shape the cell-strips, and the manner of supporting said punches in their respective heads is by connecting them to bars 175 and 176, respectively, (shown in Figs. 15 and 16,) and securing said bars to said heads, as represented. Fixed on the inner end of shaft 133 is a ratchet-wheel 147, and sleeved on said shaft at the side of said wheel is a latch-lever 148, adapted to be operated by hand, to engage by its latch the said ratchet-wheel 147 and thus operate said shaft 133 and gears 134, 129, and 131 to operate the rolls 3 and 4 to start the feed of the broad paper strips 10 and shear and form a series of cell-strips 12 of sufficient length to be entered into the machine into proper position for the general starting of the machine into operation, and as a means of gaging the movement of said lever to thus perform such initial operation an adjustable stop 149 (see Fig. 3) is placed, against which said lever engages on its full movement. A lever 150 is fulcrumed on stud 135 and is provided with a spring-latch pawl 151 for engaging the teeth of ratchet-wheel 142 for a like purpose as said lever 148 (see said Fig. 3) for making a like initial feed to the broad paper strip 21 and initially shearing and feeding the cell-strips 23 for a like purpose as described of cell-strips 12, and an adjustable stop 152 is placed to properly arrest the movement of said hand-lever, and the purpose of the eight teeth of the ratchet-wheel 142 being to properly accommodate the pawl of said hand-lever.

In the mechanism for actuating the blades 34 and 48 the connecting-rod 122 is made with oppositely-screw-threaded end connections, as shown in Fig. 5, so as to be adjusted as to length for vertically adjusting the said blades. In the roll-housings of the machine the feed-roll boxes 155 are each connected with a link of the eccentric-adjusting mechanism, before described, through the agency of a cross-head 153 and rods 154, which are screw-threaded at their upper end portion, turned into said cross-head at their upper end, provided with nuts 156 thereon below said cross-head, and passed down into holes of the box, where they are retained by cross-keys 157 in slots thereof, which slots are of sufficient length to permit a limited vertical play in said box, and interposed between said box and said nuts is a rubber cushion 158, capped by a metal plate 159, against which the nuts are turned, so that a down movement of cross-head 153 will bring the said cushion to yieldingly bear upon the roll-box and thereby yieldingly hold the upper roll down upon the lower roll, and so that an up movement of said cross-head will, through the agency of said rods 154, lift said upper roll from the said lower roll, the nuts 156 being made adjustable on the rod 154 for the purpose of regulating the tension of said upper roll upon the lower roll by reason of increasing or diminishing the distance between the cross-head 153 and cushion 158.

I wish it to be distinctly understood that I believe myself to be the inventor, broadly, of a cell-case machine for automatically manufacturing the cell-case shown in Fig. 23 of the drawings and wherein a series of longitudinal cell-strips are inserted through a series of transverse cell-strips having in each a series of holes or openings through which the longitudinal strips are passed, and that I desire herein to broadly claim the combination, in a cell-case machine, of means for holding the transverse series of cell-strips in position to form a cell-case, with means for inserting the longitudinal series of strips through the holes or openings in the transverse strips whatever may be the particular construction of the holders or devices for retaining the transverse series of strips in position or of the devices for rolling or folding the longitudinal strips about their longitudinal axes and of inserting them through the transverse strips, and, further, that it is my intention in the claims which I herein make to claim my invention in its entirety and all the novel features and combinations thereof broadly and generically.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. The herein-described cell-case machine provided with cutting, punch and die and

feeding mechanism for shearing, shaping and feeding forward the two series of cell-forming strips, as set forth; with compartment-guides and mechanism for receiving, retaining and severing sets of sections of said series of strips; with wrapping-shafts arranged to receive and wrap thereabout one set of said section of strips to convey the same through the perforations of the opposite set of sections of said series of strips while within the perforations of said opposite set of sections of strips, thereby interlocking said two sections of strips together and thus forming the sets of cells as shown, and with mechanism for discharging said cells from the machine, substantially as specified.

2. The cell-case machine comprising punch and dies for forming and shearing, and feeding forward two series of cell-forming strips; guides for conducting said series of strips forward at right angles to each other; one series direct to a cell-forming compartment, and one series to a primary severing and wrapping compartment; slotted wrapping-shafts for receiving within their slots said latter series of strips; cutters for severing said series of strips from their infeeding portions; blades for delivering said series of strips to within the slots of said wrapping-shafts; means for rotating said shafts to wrap said strips thereabout for conveying the same from said primary compartment to the said cell-forming compartment through perforations of said former infed series of strips, for unwrapping said wrapped series of strips and thereby interlocking them with said former infed strips and for withdrawing said shafts from said cell-forming compartment; cutters for severing said former infed series of strips from their infeeding portions, blades for discharging the interlocking strips or formed cells from said cell-forming compartment, and the means substantially as shown and described for operating the parts in the manner set forth.

3. In the cell-case machine described in combination, the two sets of punches and dies and shearing and feed rolls, arranged at stations to form and feed forward two series of cell-forming strips; one series at right angles to the other series; the spiral guides for conducting said strips from said rolls and for spirally turning them from a horizontal to a vertical side position; the cell-forming compartment comprising the series of equidistant blocks, having ways between them and cross-slitted at their under side as shown; the primary compartment comprising the series of parallel equidistant blocks, having ways between them in line with those of said cell-forming-compartment blocks, the slotted wrapping-shafts arranged to operate in said ways in said compartments; the cell-strip cutters arranged to operate at the strips' entrance to said compartments; the blades arranged to operate vertically between said compartment-blocks and the means substantially as shown and described for operating said operative parts in the manner, and for the purpose set forth.

4. In the cell-case machine, the cell-forming compartment comprising the series of parallel equidistant blocks removably seated at their ends, cross-slitted in their under side at right angle to their length, and provided with passage-ways for wrapping-shafts and cell-strips wrapped thereabout, and the strip-wrapping shafts adapted to be entered into said compartment in said passage-ways, substantially as and for the purpose specified.

5. In the cell-case machine in combination with the cell-forming compartment, the primary cell-strip compartment comprising the series of parallel equidistant blocks removably seated at their ends and provided with the longitudinal hollows forming passage-ways between them; and the wrapping-shafts arranged in said passage-ways, and adapted to receive, and be actuated to wrap thereabout, the series of cell-strips, substantially as and for the purpose specified.

6. In the machine described the primary cell-strip-compartment division-blocks 24 provided with the separable bottom portions 37, and placed to provide spaces between them for the reception of the cell-strips, and shaped to provide longitudinal ways between them for the operation and passage of the cell-strip-wrapping shafts; and wrapping-shafts arranged and operated in said ways, substantially as and for the purpose specified.

7. In the machine described, the cell-forming-compartment division-blocks 38 shaped to provide wrapping-shaft ways to admit the strip-wrapping shafts and accommodate the unwrapping of the strips from said shafts, and provided with cross-strip ways; the strip-wrapping shafts adapted to be operated to deliver strips wrapped thereabout into said compartment; and means for operating said shafts to unwrap the strips therefrom, substantially as and for the purpose specified.

8. In the machine described, the cell-forming-compartment division-blocks 38 shaped to provide the wrapping-shaft ways, and provided with the stripping-edges 42 and 43 adjacent said ways; the wrapping-shafts adapted to be operated in said ways and deliver sets of cell-forming strips therein, and means for operating said shafts to unwrap said strips, substantially as and for the purpose specified.

9. In the machine described in combination with the cross-beams 27 28 and 41 respectively provided with side-extending tongues as shown; the compartment division-bars 24 and 38 respectively provided with end vertical recesses, and adapted to be removably seated between said cross-beams and held so the spaces between them will be equidistant by said tongues resting in said recesses, substantially as set forth.

10. In the cell-case machine described in combination with the cell-forming compartment and the cell-strip guides leading to

within said compartment; the cutter-blocks 47 arranged adjacent said guides at the entrance to said compartment; the cutter-bar 45 provided with the cutter-sections 46 adapted to shear with said cutter-blocks, the head 54 provided with the arm 56 arranged connecting said cutter-bar, and the means for intermittently oscillating said head, substantially as and for the purpose specified.

11. In the cell-case machine described, in combination with the primary cell-strip compartment and the guides leading thereto, the compartment division-blocks 24 provided with the shear-plates 33 attached thereto adjacent said guides at the entrance to said compartment; the cutter-bar 31 provided with the cutter-sections 32 adapted to shear with said plates 33; the head 54 provided with the arm 55 arranged connecting said cutter-bar, and the means for intermittently oscillating said head, substantially as and for the purpose specified.

12. In the machine described in combination with the cell-strip-cutter bars 31 and 45, and the driven cam 85; the vertical shaft 127, the arm 128 fixed to the lower end portion thereof, and provided with a wrist operating in the channel of said cam and with the head 54 at its upper end; and the arms 55 and 56 arranged respectively engaging said cutter-bars substantially as and for the purpose specified.

13. In the cell-case machine, in combination with the cell-forming compartment comprising the parallel equidistant and cross-slitted blocks, the blades adapted to be operated between said blocks, to discharge finished cells from said compartment, and the means for operating said blades, substantially as set forth.

14. In the cell-case machine, in combination with the primary cell-strip compartment, comprising the parallel equidistant blocks, as shown, and with the slotted traveling wrapping-shafts, arranged in way between said blocks; the blades adapted to be operated to deliver the cell-strips fed into the upper portion of said compartment-stripways, down into the slots of said shafts; the cell-strip stop-bars arranged across the under portion of said compartment for arresting said strips and the means for operating said blades, substantially as set forth.

15. In the machine described, in combination with the cell-strip and cell-forming compartment blade and head 49 thereof provided with the down-extending rods 120, and with the driven cam 84; the pivoted lever 117 provided with a wrist-roller 119 operating in the channel of said cam the connecting-rod 122 and cross-head 121 arranged connecting said lever with said blade-head rods, substantially as and for the purpose specified.

16. In the cell-case machine in combination with the primary and cell-forming compartments, the slotted rotatable and traveling wrapping-shafts, substantially as and for the purpose specified.

17. In the cell-case machine in combination with the primary and cell-forming compartments, provided with guideways substantially as set forth; the slotted rotatable traveling wrapping-shafts arranged to traverse the ways extending jointly across said compartments, substantially as and for the purpose set forth.

18. In the cell-case machine in combination with the primary and cell-forming compartments, provided with the guideways substantially as set forth; the slotted rotatable traveling wrapping-shafts arranged to traverse the ways extending jointly across said compartments and reduced in diameter throughout their strip-contacting section, substantially as and for the purpose specified.

19. In the cell-case machine in combination with the primary and cell-forming compartments, provided with the guideways substantially as set forth; the slotted rotatable traveling wrapping-shafts, arranged to traverse the ways extending jointly across said compartments, reduced in diameter throughout their strip-contacting section and provided with segmental flanges at said reduced sections, substantially as and for the purpose specified.

20. In the cell-case machine in combination with the primary cell-strip compartment and the cell-forming compartment comprising the series of parallel equidistant division-blocks shaped to provide ways between them; the reciprocating carriage, the slotted wrapping-shafts boxed thereto and provided with pinions, as shown, the cross-toothed rack arranged in mesh with said pinions; and the means for reciprocating said carriage, and actuating said rack, substantially as specified.

21. In the machine described, the wrapping-shafts 35, slotted longitudinally to receive therein the cell-strips, and provided with the segmental flanges, substantially as and for the purpose specified.

22. In the cell-case machine, in combination with the drive-shaft thereof, the latch-arm and peripheral cam fixed on said shaft, and the reciprocating carriage; the cell-strip wrapping-shafts provided with the pinions, as shown, and boxed to said carriage; the toothed rack arranged in a cross-guideway, of said carriage and in mesh with said pinions and provided with the pin depending from its end portion; the cross-recessed bar arranged extending under the end portion of said rack; the bell-crank lever carried by said carriage and connected with said rack; the pivoted latch-arm and hooked lever arranged in line and adapted to engage with the side extending branch of said bell-crank and adapted to be actuated respectively by said latch-arm and peripheral cam to throw said bell-crank and actuate said rack and pinions, substantially as and for the purpose described.

23. In the cell-case machine, in combination with the reciprocating carriage and rack-actuating lever thereof; the pivoted arm; the rotary latch-arm adapted to engage said pivoted arm for engaging and throwing said lever in one direction; the pivoted hooked lever; the rotary peripheral cam, of the machine-driving mechanism, arranged to engage and operate said hooked lever, to in turn engage and throw said rack-actuating lever in the opposite direction, substantially as and for the purpose specified.

24. In the machine described in combination with the rotary latch-arm 82, and the reciprocating carriage 60; the pivoted arm 109, the lever 108, the toothed rack 61 and the wrapping-shafts 35 provided with the pinions 59 arranged in mesh with said rack, substantially as and for the purpose specified.

25. In the machine described in combination with the reciprocating carriage 60, and toothed rack 61 thereof, provided with the depending pin 112; the stationary horizontally-extending bar 110 provided with the cross-recess 111, substantially as and for the purpose specified.

26. In the machine described, in combination with the rotary cam 83, and the reciprocating carriage 60; the pivoted hooked lever 114 and spring-arm 115 thereof, the lever 108, the toothed rack 61, and the wrapping-shafts 35 provided with the pinions 59 arranged in mesh with said rack, substantially as and for the purpose specified.

27. In the cell-case machine, in combination with the traveling rotatable wrapping-shafts and carriage thereof, and with the drive-shaft, the latch mechanism for imparting rapid rotary movement in one direction, to said wrapping-shafts at one junction of said carriage, and the lever mechanism for imparting reverse rotary movement to said shafts at the opposite junction of said carriage substantially as and for the purpose set forth.

28. In the cell-case machine, in combination with the reciprocating carriage, provided with the horizontally-extending push-rod, the pivoted holding-arm adapted to be engaged and operated by said push-rod, to assume a horizontal position, substantially as and for the purpose specified.

29. In the machine described in combination with the driven segment 88; the ratchet-wheels 138 and 142; the arms 139 and 146; the shafts 178 and 133, the gears 136 and 137, the arms 163, the pawls 143 and 164; and the connecting-rods 144 and 145, substantially as and for the purpose specified.

30. In the cell-case machine, the combination with the intermittent reciprocating wrapping-shaft carriage, and segment-arm for operating said carriage of the driven oscillating toothed segment, the loose toothed gear-wheel arranged in mesh therewith, the shaft carrying the crank connecting said carriage-operating segment-arm, the pawl-and-ratchet mechanism, whereby said cranked shaft is driven during the time of movement one way of said oscillating segment and permitted to remain idle during the time of movement the opposite way of said segment, and mechanism for locking said shaft against movement while idle, substantially as set forth.

31. In the machine described, in combination with segment-arm 88, the head 94 provided with the oppositely-facing peripheral offsets the spring-arm 98 arranged to engage one of said offsets to prevent reverse movement of said head; the pivoted arm 99 arranged to engage the other of said offsets to arrest rotary movement of said head, and the stop 100 of said segment-arm arranged to engage and lift said pivoted arm from such engagement, substantially as and for the purpose specified.

32. In the machine described in combination with the driven segment-arm 88 provided with the stop 100, the crank-shaft 90 the gear 92 sleeved thereon in mesh with said segment-teeth; the head 94 fixed on said shaft, and provided with a spring-pawl 95 arranged to engage a tooth of a hub-flange of said gear; the spring-arm 98 arranged to engage a peripheral offset of said head to prevent reverse rotation thereof, and the pivoted arm arranged to engage an oppositely-facing offset of said head to arrest movement thereof and to be lifted from such engagement by the stop of said segment, substantially as and for the purpose specified.

33. In the machine described in combination with the drive-shaft and cranked disk 85; the segment-arm 88 provided with the stop 100 the shaft 90, the spur-gear 92 sleeved on said shaft, arranged in mesh with the teeth of said segment, and provided with the toothed hub-flange 93; the head 94 provided with the peripheral offsets and fixed on said shaft, and provided with the spring-pawl arranged to engage said flange-tooth, the crank 105 fixed on the inner end of said shaft, the toothed segment-arm 102 arranged to be operated by said crank, and the stop-arms 98 and 99 arranged to engage the offsets of said head and the arm 99 to be engaged by said stop 100, substantially as and for the purpose specified.

34. In the cell-case machine, the spiral cell-strip guides reduced in width at their strip-receiving end, and provided with the notch at their opposite end for registering with up projections of their supports, substantially as set forth.

35. In a cell-case machine, the combination with a series of holders or devices for holding a series of transverse strips in position to form a cell-case, of a slotted shaft or spindle for rolling or folding a longitudinal cell-strip about its longitudinal axis, and a guideway or chamber the wall of which surrounds said slotted shaft or spindle to prevent the rolled or folded strip from unwinding and to guide the same into and through the holes or openings in the transverse strips and means for threading the longitudinal strips through the

perforations in the transverse strips, substantially as specified.

36. In a cell-case machine, the combination with a series of holders or devices for holding a series of transverse strips in position to form a cell-case, of a slotted shaft or spindle for rolling or folding a longitudinal cell-strip about its longitudinal axis, and a guideway or chamber the wall of which surrounds said slotted shaft or spindle to prevent the rolled or folded strip from unwinding and to guide the same into and through the holes or openings in the transverse strips, and means for feeding the longitudinal strip into the slot of such shaft or spindle, substantially as specified.

37. In a cell-case machine the combination with a series of transverse cell-strip holders, of a series of reciprocating slotted shafts or spindles about which the longitudinal strips are wound or folded, and a series of guideways surrounding said shafts and extending between the transverse strips to guide the longitudinal strips, when wrapped about such shafts or spindles, through the holes or openings in the transverse strips, substantially as specified.

38. In a cell-case machine the combination of a series of transverse cell-strip holders, of a series of reciprocating slotted shafts or spindles about which the longitudinal strips are wound or folded, and a series of guideways surrounding said shafts and extending between the transverse strips to guide the longitudinal strips, when wrapped about such shafts or spindles, through the holes or openings in the transverse strips, said transverse cell-strip holders and said guideways for the longitudinal strips being bottomless or having an open passage downward to permit the finished cell-case to be discharged therefrom when said slotted shafts or spindles are withdrawn, substantially as specified.

39. In a cell-case machine the combination with a series of transverse cell-strip holders, of a series of reciprocating slotted shafts or spindles about which the longitudinal strips are wound or folded, and a series of guideways surrounding said shafts and extending between the transverse strips to guide the longitudinal strips, when wrapped about such shafts or spindles, through the holes or openings in the transverse strips, said transverse cell-strip holders and said guideways for the longitudinal strips being bottomless or having an open passage downward when said slotted shafts or spindles are withdrawn, and delivering blades or devices for discharging the finished cell-case, substantially as specified.

40. In a cell-case machine, the combination with a series of transverse cell-strip holders, of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding or delivering said longitudinal cell-strips to said slotted shafts, and means for threading the longitudinal strips through the perforations in the transverse strips, substantially as specified.

41. In a cell-case machine, the combination with a series of transverse cell-strip holders, of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding or delivering said longitudinal cell-strips to said slotted shafts, said slotted shafts being reversely rotatable for the purpose not only of rolling or folding the cell-strips about them but also for unrolling or folding the same and interlocking the longitudinal strips after the former are inserted through the latter, and means for threading the longitudinal strips through the perforations in the transverse strips, substantially as specified.

42. In a cell-case machine, the combination with a series of transverse cell-strip holders, of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding or delivering said longitudinal cell-strips to said slotted shafts, said means for feeding or delivering said transverse cell-strips to their holders, having a device for turning or twisting each of said strips from a horizontal to a vertical plane, and means for threading the longitudinal strips through the perforations in the transverse strips, substantially as specified.

43. In a cell-case machine, the combination with a series of transverse cell-strip holders,

of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding or delivering said longitudinal cell-strips to said slotted shafts, said means for feeding or delivering said transverse cell-strips to their holders, having a device for turning or twisting each of said strips from a horizontal to a vertical plane, and said means for feeding or delivering said longitudinal cell-strips having a device for turning or twisting each of said longitudinal strips from a horizontal to a vertical plane, and means for threading the longitudinal strips through the perforations in the transverse strips, substantially as specified.

44. In a cell-case machine, the combination with a series of transverse cell-strip holders, of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding or delivering said longitudinal cell-strips to said slotted shafts, and means for threading the longitudinal strips through the perforations in the transverse strips and devices for cutting said transverse strips to length, substantially as specified.

45. In a cell-case machine, the combination with a series of transverse cell-strip holders, of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding and delivering said longitudinal cell-strips to said slotted shafts, and devices for cutting said longitudinal cell-strips to length, and means for threading the longitudinal strips through the perforations in the transverse strips, substantially as specified.

46. In a cell-case machine, the combination with a series of transverse cell-strip holders, of mechanism for forming and slitting or shearing a series of transverse cell-strips from a continuous web of strawboard or paper, means for feeding or delivering said transverse cell-strips into said transverse cell-strip holders, a series of reciprocating slotted shafts or spindles for receiving, holding and rolling or folding a series of longitudinal cell-strips about their longitudinal axes, a series of guideways surrounding said reciprocating slotted shafts and extending between the transverse cell-strips, mechanism for forming and slitting or shearing said series of longitudinal cell-strips from a web of strawboard or paper, and means for feeding or delivering said longitudinal cell-strips to said slotted shafts, said devices for cutting said transverse strips to length, devices for cutting said longitudinal strips to length, and means for threading the longitudinal strips through the perforations in the transverse strips and means for discharging or ejecting the completed cell-case, substantially as specified.

47. In a cell-case machine, the combination with two horizontal strawboard-web feed tables or beds at right angles to each other, mechanism for feeding said webs along, mechanism for forming and dividing one of said webs into transverse cell-strips, mechanism for forming and dividing the other of said webs into longitudinal cell-strips, a series of holders for receiving the transverse cell-strips, devices for turning the transverse cell-strips from a horizontal to vertical planes as they are fed forward into said holders, devices for severing the transverse cell-strips into lengths, a series of reciprocating slotted shafts for receiving the longitudinal cell-strips, a series of devices for turning the longitudinal cell-strips from a horizontal to vertical planes and guiding them into position over said slotted shafts, a series of devices for severing said longitudinal cell-strips to length, a series of blades or devices for pushing said longitudinal cell-strips into the slots of said shafts, and a series of guideways surrounding said reciprocating shafts and extending between the transverse cell-strips in said transverse cell-strip holders, and means for threading the longitudinal strips through the perforations in the transverse strips, substantially as specified.

48. In a cell-case machine, the combination with two horizontal strawboard-web feed tables or beds at right angles to each other mechanism for feeding said webs along, mechanism for forming and dividing one of said webs into transverse cell-strips, mechanism

for forming and dividing the other of said webs into longitudinal cell-strips, a series of holders for receiving the transverse cell-strips, devices for turning the transverse cell-strips from horizontal to vertical planes as they are fed forward into said holders, devices for severing the transverse cell-strips into lengths, a series of reciprocating slotted shafts for receiving the longitudinal cell-strips, a series of devices for turning the longitudinal cell-strips from horizontal to vertical planes and guiding them into position over said slotted shafts, a series of devices for severing said longitudinal cell-strips to length, a series of blades or devices for pushing said longitudinal cell-strips sidewise into the slots of said shafts, a series of guideways surrounding said reciprocating shafts and extending between the transverse cell-strips in said transverse cell-strip holders, and means for rotating said slotted shafts first in one direction to roll or fold said longitudinal strips about the same and then, after said longitudinal strips have been inserted in said transverse strips by the forward reciprocating movement of said shafts, in the opposite direction for the purpose of unwinding or unfolding said longitudinal strips and causing the same to interlock with the transverse strips, substantially as specified.

49. In a cell-case machine, the combination with two horizontal strawboard-web feed tables or beds at right angles to each other, mechanism for feeding said webs along, mechanism for forming and dividing one of said webs into transverse cell-strips, mechanism for forming and dividing the other of said webs into longitudinal cell-strips, a series of holders for receiving the transverse cell-strips, devices for turning the transverse cell-strips from horizontal to vertical planes as they are fed forward into said holders, devices for severing the transverse cell-strips into lengths, a series of reciprocating slotted shafts for receiving the longitudinal cell, a series of blades or devices for pushing said longitudinal cell-strips sidewise into the slots of said shafts, a series of guideways surrounding said reciprocating shafts and extending between the transverse cell-strips in said transverse cell-strip holders, and means for rotating said slotted shafts first in one direction to roll or fold said longitudinal strips about the same and then after said longitudinal strips have been inserted in said transverse strips by the forward reciprocating movement of said shafts in the opposite direction for the purpose of unwinding or unfolding said longitudinal strips and causing the same to interlock with the transverse strips, and means for discharging the finished cell-case in a direction at right angles to its plane, substantially as specified.

50. In a cell-case machine, the combination with a slotted reciprocating rotatable shaft, of a guide surrounding said shaft and in which it reciprocates, and means for pushing or delivering the longitudinal cell-strip sidewise into the slot of said shaft, substantially as specified.

51. In a cell-case machine, the combination with devices for forming and slitting in the direction of its length a continuous web of strawboard or paper into longitudinal cell-strips, of devices for twisting or turning said strips from horizontal to vertical planes and bringing them edgewise over and into registry with a series of slotted wrapping shafts or spindles, a series of devices for severing said longitudinal cell-strips into lengths, a series of slotted wrapping shafts or spindles, and a series of blades for pushing said series of longitudinal strips into said slotted shafts, substantially as specified.

52. In a cell-case machine, the combination with devices for forming and slitting in the direction of its length a continuous web of strawboard or paper into longitudinal cell-strips, of devices for twisting or turning said strips from horizontal to vertical planes and bringing them edgewise over and into registry with a series of slotted wrapping shafts or spindles, a series of devices for severing said longitudinal cell-strips into lengths, a series of slotted wrapping shafts or spindles, and a series of blades for pushing said series of longitudinal strips into said slotted shafts, and a series of guideways surrounding said slotted shafts, substantially as specified.

53. In a cell-case machine, the combination with a reciprocating slotted wrapping-shaft, a guideway surrounding it, having a slot or passage for the admission of a cell-strip into the slot of said shaft in a direction at right angles to the shaft, and a reciprocating blade for pushing the cell-strip into the slot of the shaft, substantially as specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ALBERT J. BATES.

In presence of—
WM. J. HUTCHINS,
JOHN C. PERRY.