No. 659,010. Patented Oct. 2, 1900.

W. E. WILLIAMS.

CELL CASE MACHINE.

(Application filed June 1, 1897.)

(No Model.) 5 Sheets—Sheet 1.

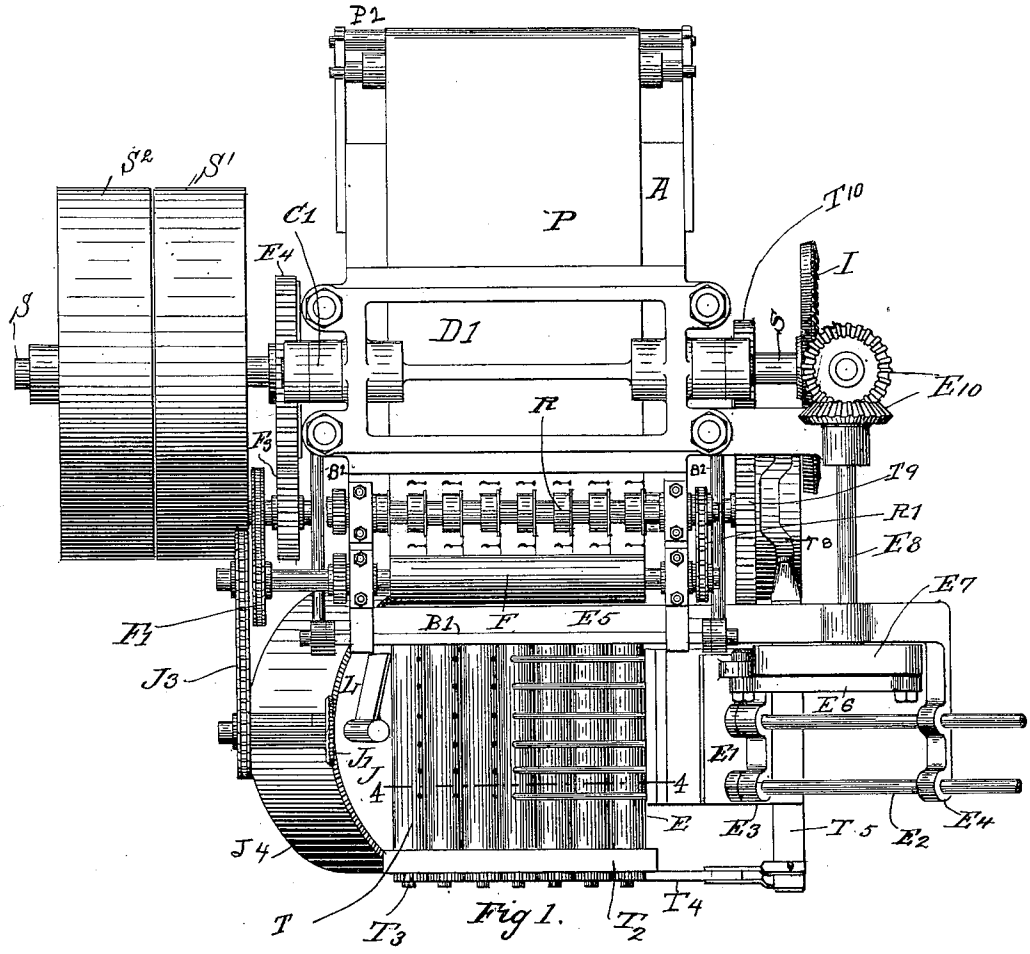


Fig 1.

Witnesses:
Fred Sommy
Frank W. Deane.

Inventor
W. E. Williams

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

No. 659,010. Patented Oct. 2, 1900

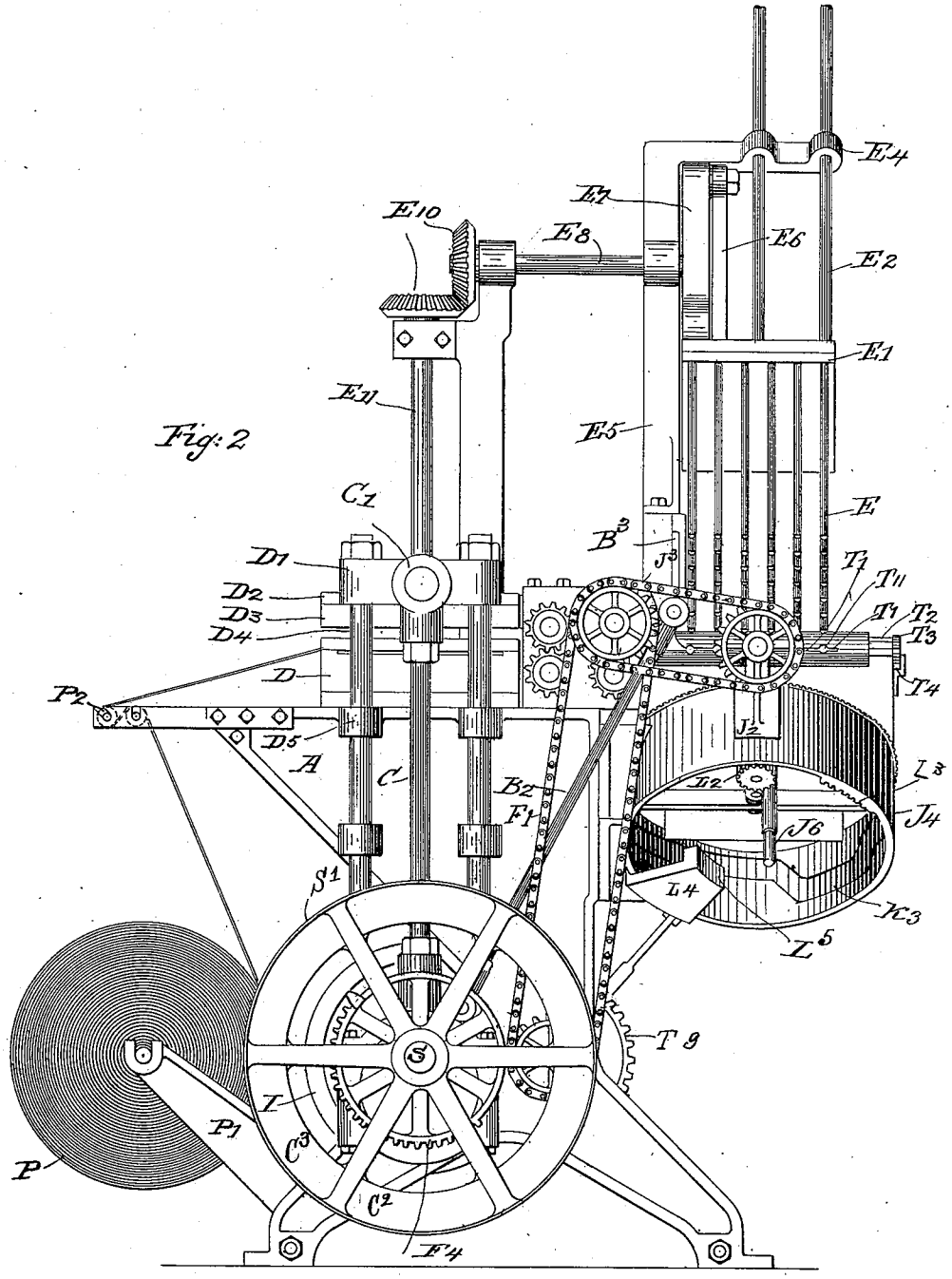
W. E. WILLIAMS.

CELL CASE MACHINE.

(Application filed June 1, 1897.)

(No Model.) 5 Sheets—Sheet 2.

Fig. 2



Witnesses:
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No. 659,010. Patented Oct. 2, 1900.

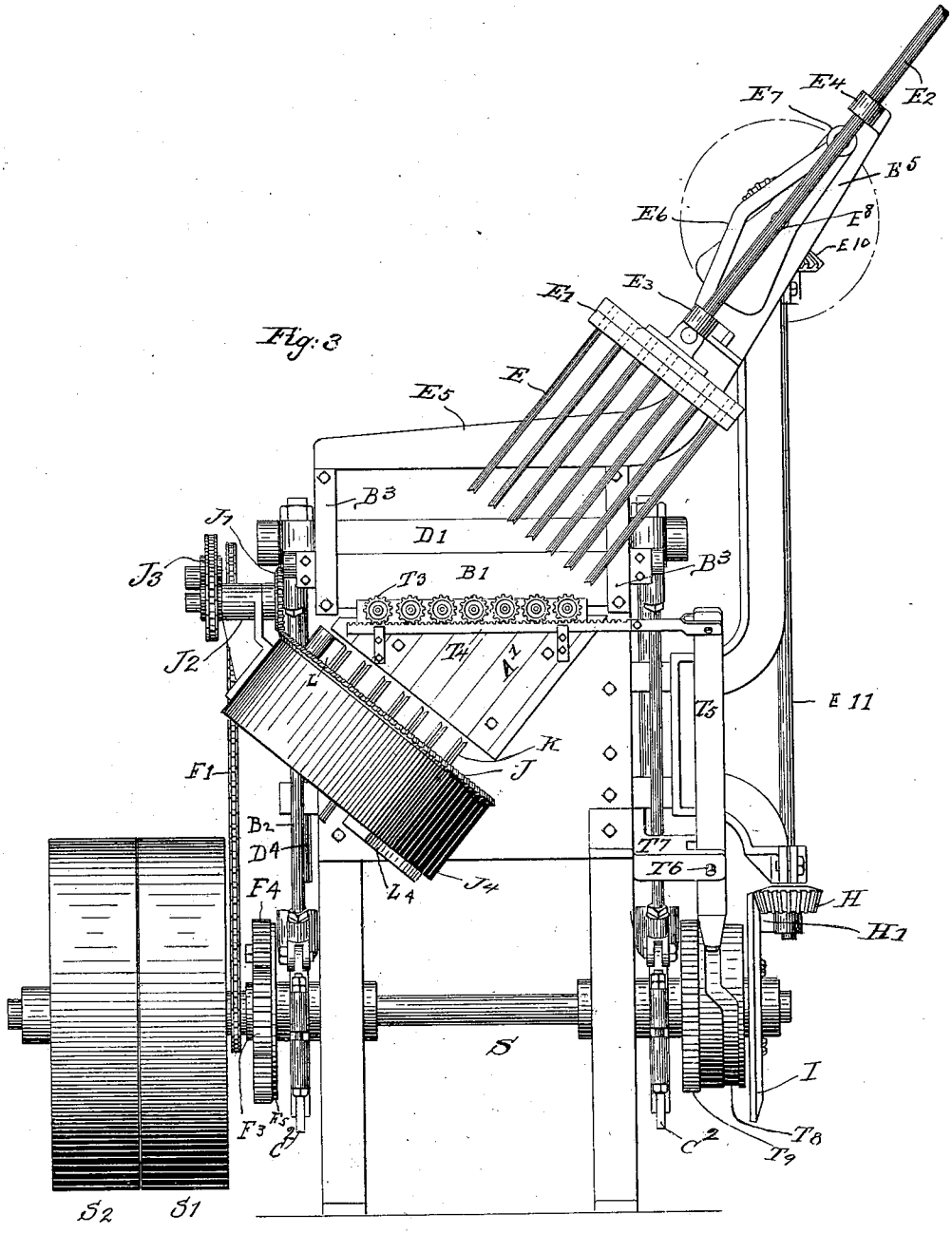
W. E. WILLIAMS.

CELL CASE MACHINE.

(Application filed June 1, 1897.)

(No Model.) 5 Sheets—Sheet 3.

Fig: 3



Witnesses:
Fred Berry
Frank H. Deane.

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No. 659,010. Patented Oct. 2, 1900.

W. E. WILLIAMS.

CELL CASE MACHINE.

(Application filed June 1, 1897.)

(No Model.) 5 Sheets—Sheet 4.

Fig: 4.

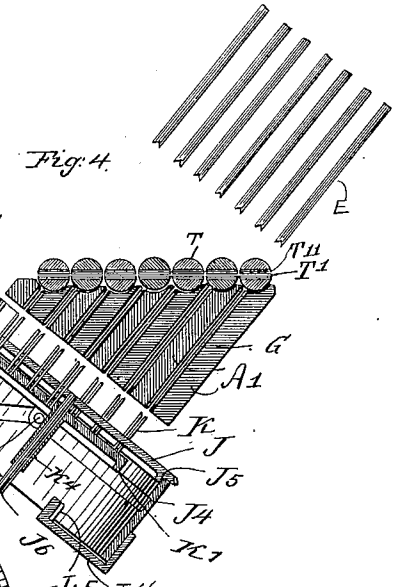


Fig: 5.

Fig: 6

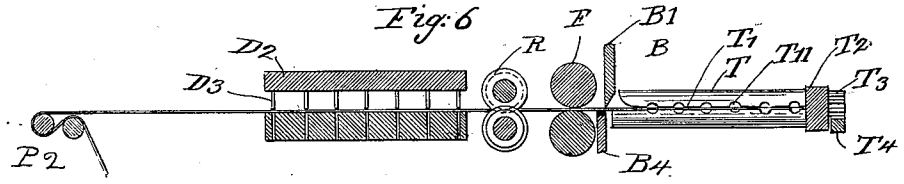


Fig: 8.

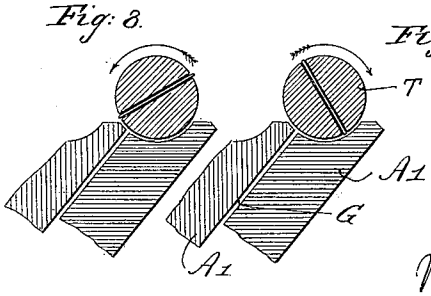


Fig: 7.

Witnesses:

Fred Barry

Frank H. Deane.

Inventor:

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Patented Oct. 2, 1900.

W. E. WILLIAMS.

CELL CASE MACHINE.

(Application filed June 1, 1897.)

(No Model.)

5 Sheets—Sheet 5.

Fig: 9

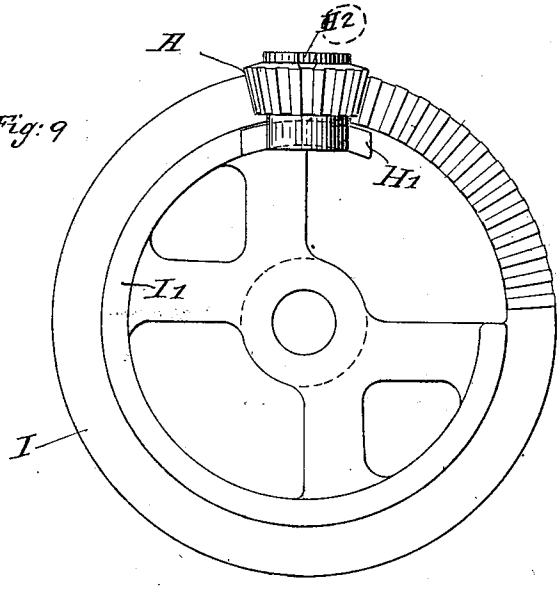


Fig: 10

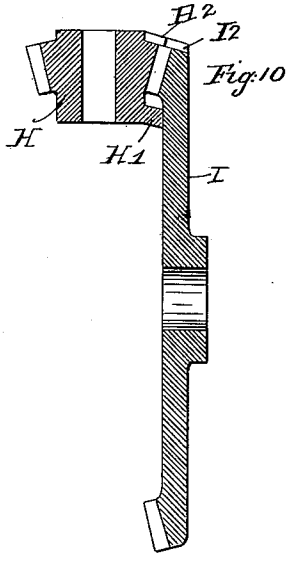


Fig: 11

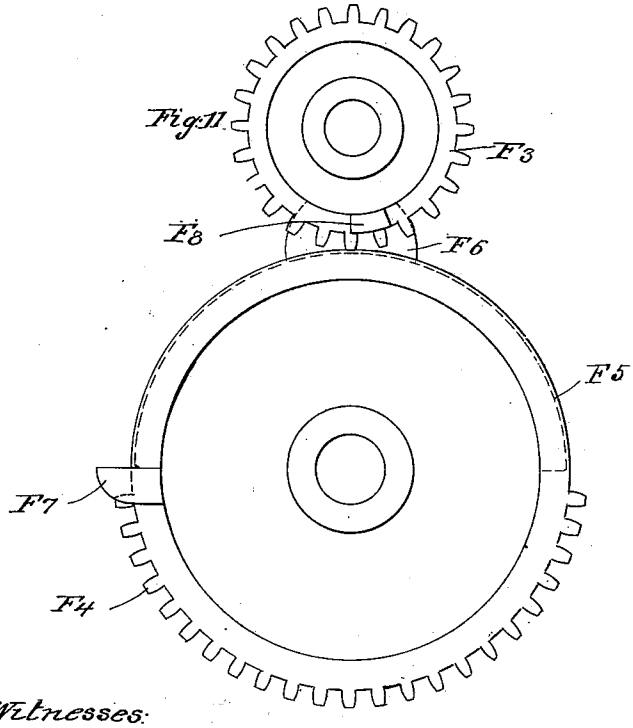
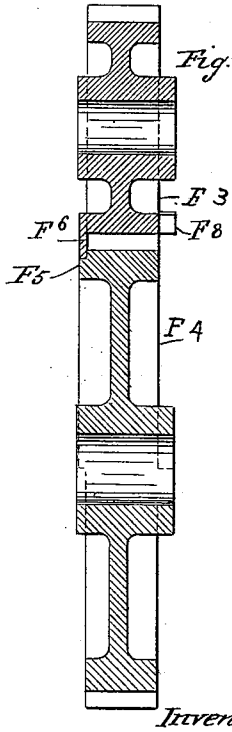


Fig: 12.



Witnesses:

Fred Berg

Frank W. Deane.

Inventor:

W. E. Williams

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

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS.

CELL-CASE MACHINE.

SPECIFICATION forming part of Letters Patent No. 659,010, dated October 2, 1900.

Application filed June 1, 1897. Serial No. 639,009. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, a citizen of the United States, residing in Chicago, county of Cook, State of Illinois, have invented new and useful Improvements in Cell-Case Machines, of which the following is a specification.

In this machine but a single roll of stock is used. The paper is first punched and then slit into strips longitudinally. These strips pass endwise into strip-turners and are then cut loose from the main strip or sheet of stock. The strips cut off are turned into inclined position, notched edges up, and are pushed laterally out of the turners into fingers projecting from a table perpendicular to the planes of the strips. The table is then rotated ninety degrees in its own plane and a second set, which has entered the turners and has notched edges downward, owing to reverse rotation of the turners, is forced into engagement with the first set. The fingers then withdraw below the surface of the table and the complete cell-case is swept off by an arm. The strips being of a constant width, the spacing depends upon the inclination the turners are made to give them, and the angle at which the sets are interlocked depends upon the degree of rotation of the table. As illustrated, the spacing is that of ordinary cell-cases, the sets are interlocked at right angles, and each set consists of seven strips.

In the drawings, Figures 1, 2, and 3 are respectively a plan, a side elevation, and an end elevation of the machine. Fig. 4 is a section on the line 4 4, Fig. 1. Fig. 5 is a plan of a certain table. Fig. 6 is a partial section in the line of the paper's feed. Figs. 7 and 8 are transverse sections of a certain turner and guideway, showing the directions of rotation of the turners at certain different periods. Figs. 9 and 10 are respectively a side view and a central section of certain intermittent gearing for driving certain pushers. Figs. 11 and 12 are analogous views showing gearing for actuating intermittently certain feed-rolls, slitting devices, and a form-table.

In the figures, A is the frame of the machine, and S a main shaft driven by a pulley S′ and provided with the usual loose pulley S^2. A roll of paper P, wide enough for seven cell-case strips, is revolubly mounted in brackets P′, and from this roll paper is carried around straightening-rolls P^2 and thence over a die-bed D, provided with a die-plate or set of dies adapted to coact with punches D^3, projecting from a punch-plate D^2, carried by a reciprocating head D′. The head is guided by rods D^4, sliding in bearings D^5, and is actuated by eccentrics C^3 upon the shaft S through eccentric-straps C^2 and rods C, connected to the head at C′. The dies are adapted to punch at a stroke all the notches in the seven strips of a set. This done, the sheet advances between slitting-rolls R, which divide it on longitudinal lines into seven strips, which then pass without lateral displacement between feed-rolls F, between the separated members of shears B, and endwise into strip-turners T, which are slotted from one end to receive them. The feed-rolls are driven from the shaft S by means of gears F^4 F^3 and a sprocket-chain F′, and a sprocket-chain R′ causes the slitting-rolls to rotate with the feed-rolls. The gear F^4 is double the size of the gear F^3; but as it has teeth on one-half only in one-half revolution it rotates the other gear a full revolution and then leaves it at rest during the remainder of its own revolution. To insure accuracy in this action, the smaller of the two gears is provided with a block F^6 to rest upon a segmental flange F^5 of the other while the non-toothed segment of the latter is passing, and thus prevent all rotary movement of the smaller gear. The gear F^3 is further provided with a block F^8 in position to be struck by a tooth F^7 upon the gear F^4 at the instant when the block F^6 is freed from the flange F^5, and thus the smaller gear is forced to begin rotation at precisely the instant when the engagement of its ordinary teeth by the teeth of the mutilated gear will continue the rotation. At the instant when such engagement ceases the block F^6 passes again upon the flange F^5, arresting F^3 at the proper instant and holding it in exact position until the larger gear has made another half-revolution. By this means the paper is fed forward and slit into strips during one half-revolution of the shaft S, while during the next half-revolution it is at rest. During this interval of rest it is punched and

the formed strips are subjected to other operations, as will appear. The parts are so proportioned that at the instant when feeding ceases the free end portions of the strips are fully within the slots of the turners T, and at this time the upper blade of the shears descends, cutting simultaneously from each strip a completed cell-case strip of proper length. This shearing by the blades B' B^4 is synchronous with the punching of a succeeding set of strips, for the blade B' is moved in its guides B^3 by rods B^2, connected to the eccentric-strap C^2, already mentioned. The strip-turners are bars or rods mounted in bearings T^2 and bearing-pinions T^3, respectively. These pinions are all in engagement with a rack T^4, which is reciprocated by the main shaft S, acting through a pinion T^{10}, gear T^9, cam T^8, fixed to said gear, and a lever T^5, pivoted at T^6 to a block T^7 on the frame. The diameter of the pinion T^{10} is half that of the gear T^9, and two revolutions of the shaft therefore cause but one revolution of the cam, and the latter is so formed that the first revolution of the shaft S rotates the turners in one direction until their slots T' are at the predetermined proper angle for discharging the strips and then returns them to their normal positions, while the second revolution of the shaft turns them in the contrary direction until their slots are in the same planes as before and then returns them again to normal position, all with the proper intervals between successive movements. The first rotation so turns a set of strips that their notched edges are uppermost, and the second contrary rotation turns the notched edges of a second set downward.

The depth of the cells in ordinary cell-cases must exceed their width, and obviously if a sheet be split into strips and if the strips be then turned ninety degrees rearrangement will be necessary, since otherwise the strips will be a strip's width apart; but if the strips be turned less than ninety degrees the distance from one strip to the next or to the plane of the next may be as small as is desired, since that distance increases with the angle through which they are turned, beginning with zero and reaching a maximum (the width of a strip) at ninety degrees. Whatever the width of the strips, then, the distance between them, and consequently the width of the cells, depends entirely upon the angle through which the strips are turned; but if the turning be less than ninety degrees the strips will not be, as they should be, perpendicular to the plane of the set which they form. To obviate this difficulty, the strips when properly inclined by any suitable means are moved edgewise, each in its own plane, through different distances, each moving farther than the one preceding, and thereby all are brought into a general plane, or new plane of the set, perpendicular to the planes of the individual strips. This result may be practically accomplished as follows: At some distance from the turners is a table J both parallel to the axes of the strips and perpendicular to their planes when they are inclined, as just suggested. When the strips of a set have been thus properly inclined, they are pushed laterally out of the turners and toward the table by a set of similarly-inclined pushers E, having forked ends and adapted to pass through the turners in enlargements T^{11} of the slots T' therein. These pushers are fixed in a head E', carried by rods E^2, moving in guides E^3 E^4 upon a support E^5 and actuated from the shaft S by gears I H, shaft E^{11}, gears E^{10}, shaft E^8, crank E^7, and pitman E^6. The gear I is mutilated and so formed and proportioned as to impart a complete revolution to the gear H during a certain quadrant of its own revolution and to hold it fixed during the remaining time, and thus the pushers act and return to initial position while the shaft S rotates ninety degrees. To insure accuracy in these movements, the two gears are provided with a flange I', tooth I^2, and block H' and tooth H^2, all acting substantially like similar parts already described. The strips are set in motion successively by the pushers owing to the obliquity of the pushers to the plane in which the strips are arranged, and as they are pushed from the turners they enter guideways G, formed by properly-spaced blocks A', rigidly supported by the frame of the machine and transversely grooved to form ways for the pushers, respectively. The blocks all terminate a little more than a strip's width from the table J, and as the strips advanced by the pushers emerge from the guideways they are received by fingers K, projecting above the surface of the table, upon which the strips come to rest notches uppermost and exactly spaced. The table is circular and is provided with an annular shoulder J^5, by which it is accurately held in a ring J^4. The table has marginal teeth and is intermittently rotated, turning through an angle of ninety degrees for each revolution of the shafts S, by means of a chain J^3 from the upper feed-roll F and a pinion J', mounted in a bracket J^2 and engaging said marginal teeth. The fingers are fixed to a plate K', which lies below the table and has a sleeve-bearing K^4, that slides upon a stud J^6, depending from the table. This plate is carried toward and away from the table by rollers K^2, traveling in a cam-groove K^3 in the ring J^4, and thus the fingers are alternately projected above the surface of the table and withdrawn below it, and this, owing to the form of the groove, occurs twice during each revolution of the table. Now a set of strips being held by the fingers, notches uppermost, the table turns ninety degrees, and then a second set, notched edges downward, is pressed down by the pushers and forced into engagement with the first set, forming a completed cell-case. The table then revolves ninety degrees, the fingers withdrawing during the first part of the movement, and the case is swept off the table by an arm L, borne

by a shaft L', having a bearing in the table and carrying at its lower end a gear L^2 to engage a segmental rack L^3 upon the ring J^4 and cause the arm to swing through a suitable arc at the proper time. When the next succeeding case is to be discharged, the table having meantime rotated one hundred and eighty degrees, this gear is upon the opposite side of the ring J^4; but by placing a rack L^5 upon the inner side of the pinion upon an arm L^4 instead of upon the ring itself the arm is still caused to discharge the case in the proper direction and come to rest in such position that the succeeding movements of the table bring it to precisely its initial position ready to be again operated by the rack first mentioned as upon the ring J^4. Thus for every complete revolution of the table—that is, for every four revolutions of the main shaft and every four strokes of the punches—two complete cell-cases are discharged.

The device for discharging the cell-cases is thought entirely novel and desirable for use with other machines, and the same is true of the means for reducing the spaces between the strips, since so far as these features are concerned it is not material that the other mechanisms be those shown, and radically-different strips may be thus spaced or any cell-case may be held by disappearing fingers. Other methods of spacing often involve pushing the strips while under friction, and as the strips are thin and often somewhat imperfect buckling or the catching of torn edges is not rare with ordinary machines, and since the operation of such machines is usually very rapid such mishaps cause instant clogging, that is both vexatious and costly. With the machine just described the evil is practically eliminated, for the strips are always free and are advanced positively, smoothly, and with the utmost certainty. The pushers working in the slot enlargements may serve precisely the same ends in many different machines, and obviously the value of this device does not depend upon combining it with any of the other specific mechanisms shown. It has been very common to eject strips from slots by means of a steel plate, which it is practically necessary to make of a thickness less than the width of the slots. Such plates, especially when there is imperfection in the stock, sometimes slip past the strips and fail to eject them, when clogging, of course, results. Such an accident is impossible when the pushers extend upon each side beyond the limits of the slot.

Feeding the strips endwise into the turners is far preferable to the usual method, for they remain integral with the sheet and support each other laterally until fully within the turners, while in the older devices they are cut loose, or nearly so, and are then independently pushed sidewise into the slots, with frequent clogging as a consequence.

Since many of my devices are so far independent that they may be used in machines where the other mechanisms are radically different, I wish to cover them both broadly and specifically in combination and separately.

What I claim is—

1. The combination of a strip-turner provided with a longitudinal slot extending from one end, means to rotate the strip-turner upon its longitudinal axis, and means to feed a strip endwise into the slot in the strip-turner.

2. The combination of a strip-turner provided with a longitudinal slot extending from one end, means to rotate the strip-turner upon its longitudinal axis, means to feed a continuous strip endwise into said slot, and means to afterward sever the entered portion of the strip from the body portion.

3. The combination of a set of strip-turners each provided with a longitudinal slot extending from one end, means to feed a set of strips endwise into the slots, respectively, means to then sever the entered portions of the strips from the body portions, and means to then rotate the turners upon their longitudinal axes.

4. The combination with strip-turners, of means for feeding a set of strips to said turners, and means for moving the strips from the turners, edgewise, through different distances, whereby all the strips of the set are brought into a plane perpendicular to the planes of the individual strips.

5. The combination with means to hold a set of strips while in the same plane, means to turn the individual strips into parallel planes less than a strip's width apart, and to bring corresponding edges of all the strips into a plane perpendicular to said planes.

6. In a cell-case machine, the combination with a member provided with a strip-receiving slot widened at intervals, of pushers wider than the body of the slot, and means for advancing said pushers into the passages formed by widening the slot, whereby a strip lying in the slot may be ejected.

7. The combination with a revoluble table, of means for delivering upon the table in succession sets of spaced strips, and means for turning the table on an axis passing through its center, through a predetermined angle between successive deliveries.

8. The combination with a suitable revoluble table, of a set of strip-turners, means for feeding sets of notched strips in succession into said turners, means for rotating the turners alternately in opposite directions to turn oppositely the notched edges of successive sets of strips, means for delivering the sets upon the table, successively, while so turned, and means for turning the table through a fixed angle between successive deliveries.

9. The combination with a set of revolubly-mounted strip-turners, of means for turning them alternately in opposite directions through supplemental angles.

10. The combination of a set of strip-turners arranged to receive a set of laterally-con-

tiguous strips in the same plane, means to feed a sheet of stock toward said turners, means to slit the advancing sheet into laterally-contiguous strips corresponding with the turners, means to sever the end portions of the strips after their entry into the turners, and means to turn the individual strips into planes less than a strip's width apart.

11. The combination of strip-forming devices, sheet-slitting devices, and strip-turning devices, feeding devices arranged to draw a sheet of stock through the forming and slitting devices and push it into the turning devices, means to sever the end portion of the formed and slit sheet after its entry into the turners, means for turning the strips into parallel planes less than a strip's width apart, and means to push the strips edgewise to bring their corresponding edges into a plane perpendicular to the planes of the strips and eject them from the turners.

12. The combination with means for forming identical sets of laterally-notched strips, of means for advancing the sets successively to the same position, means for turning the strips of successive sets oppositely into the same plane, a table, means for delivering the sets successively upon the table, and means for rotating the table in its own plane through a predetermined angle between the deliveries of successive sets thereon.

13. The combination with a table, of strip-holding devices normally projecting from the table's surface, and means for at intervals retracting said devices within or below said surface.

14. The combination with the table, of strip-holding fingers normally projecting from its surface, a discharging-arm and means for successively retracting the fingers and sweeping the arm across said surface.

15. The combination of a form-table provided with fingers for holding the strips, and with gear-teeth on its edges and a pinion engaging the gear-teeth for revolving the table.

16. The combination of dies and punches for punching a sheet of paper, slitters for slitting paper into strips, a feeding device for the paper with a shear for cutting off the strips, strip-turners for turning the strips edgewise, a form-table adapted to be turned through a sufficient angle to permit the interlocking of the second set of strips, and a set of pushers for pushing the strips from the turners to the form-table.

17. The combination of a set of strip-turners arranged in parallel relation to each other and a set of pushers set at an angle inclined to the plane of alinement of the turners whereby the pushers in descending engage the strips successively to bring a different arrangement of the strips at the next point of registration.

18. The combination with punching, slitting, feeding and cutting mechanism for strips, a form-table, and guideways and strip-pushers set at an incline with the plane of the paper as operated upon by the punches and slitters.

19. The combination with mechanism for punching and cutting strips, revoluble strip-turners and a cam for actuating the turners, said cam having cam-faces adapted to actuate the turners in different directions alternately, and return them to the same normal position each time.

20. The combination of mechanism for punching and cutting strips and a form for holding strips, with mechanism for delivering every alternate set of strips upon the form in reverse position as relates to the notches in their sides.

21. The combination with means for punching and cutting strips, of devices for temporarily supporting the formed strips, a table below the plane of said devices, a set of pushers adapted to push the formed strips down to said table, a crank-shaft, and a pitman carried by said shaft and reciprocating the set of pushers.

In witness whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

WILLIAM ERASTUS WILLIAMS.

Witnesses:
FRANK H. DEANE,
DANIEL STONE.