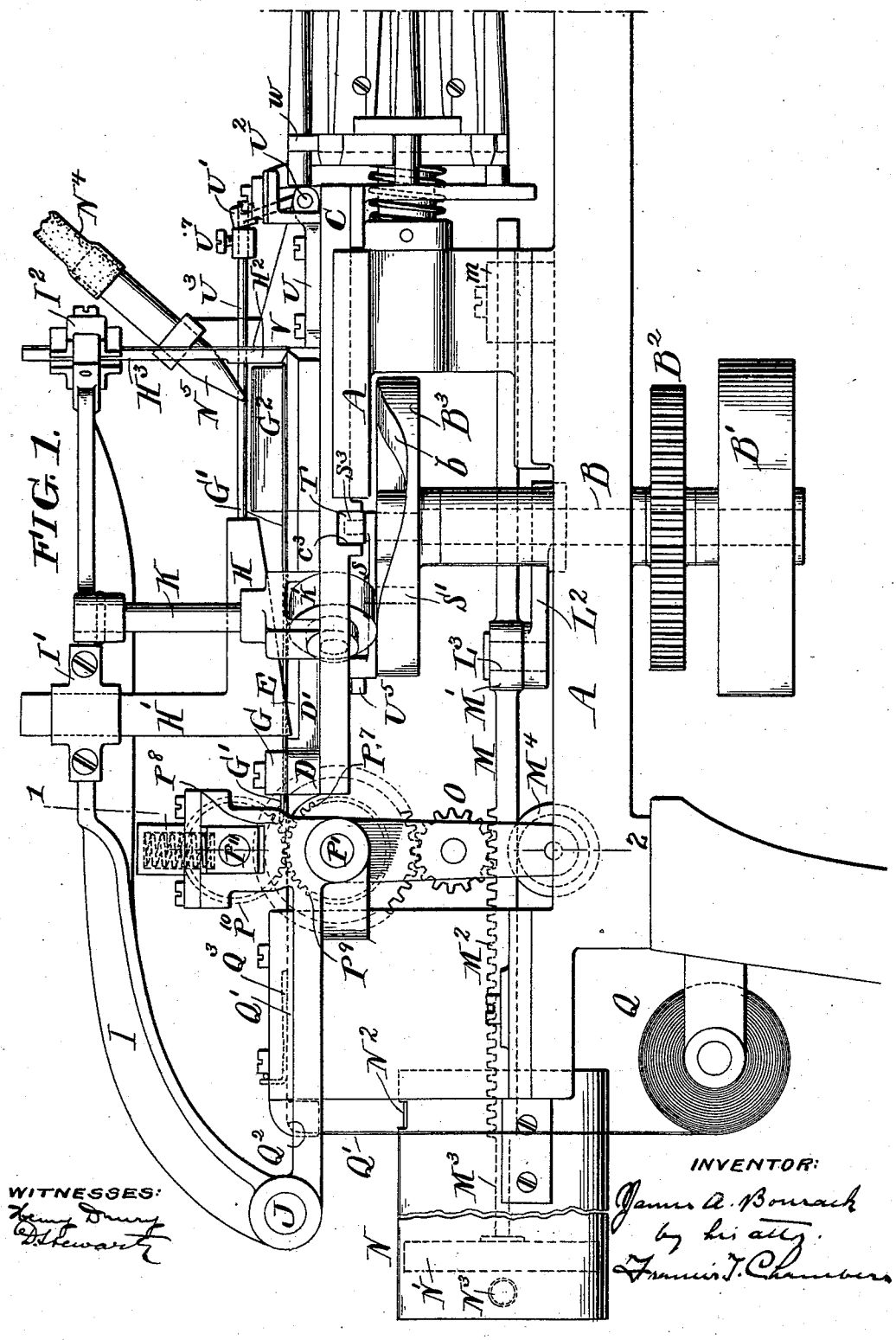
(No Model.) 6 Sheets—Sheet 1.

J. A. BONSACK.

APPARATUS FOR CUTTING CIGARETTE BLANKS.

No. 566,054. Patented Aug. 18, 1896.

FIG. 1.



WITNESSES:
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D. Stewart

INVENTOR:
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Francis T. Chambers

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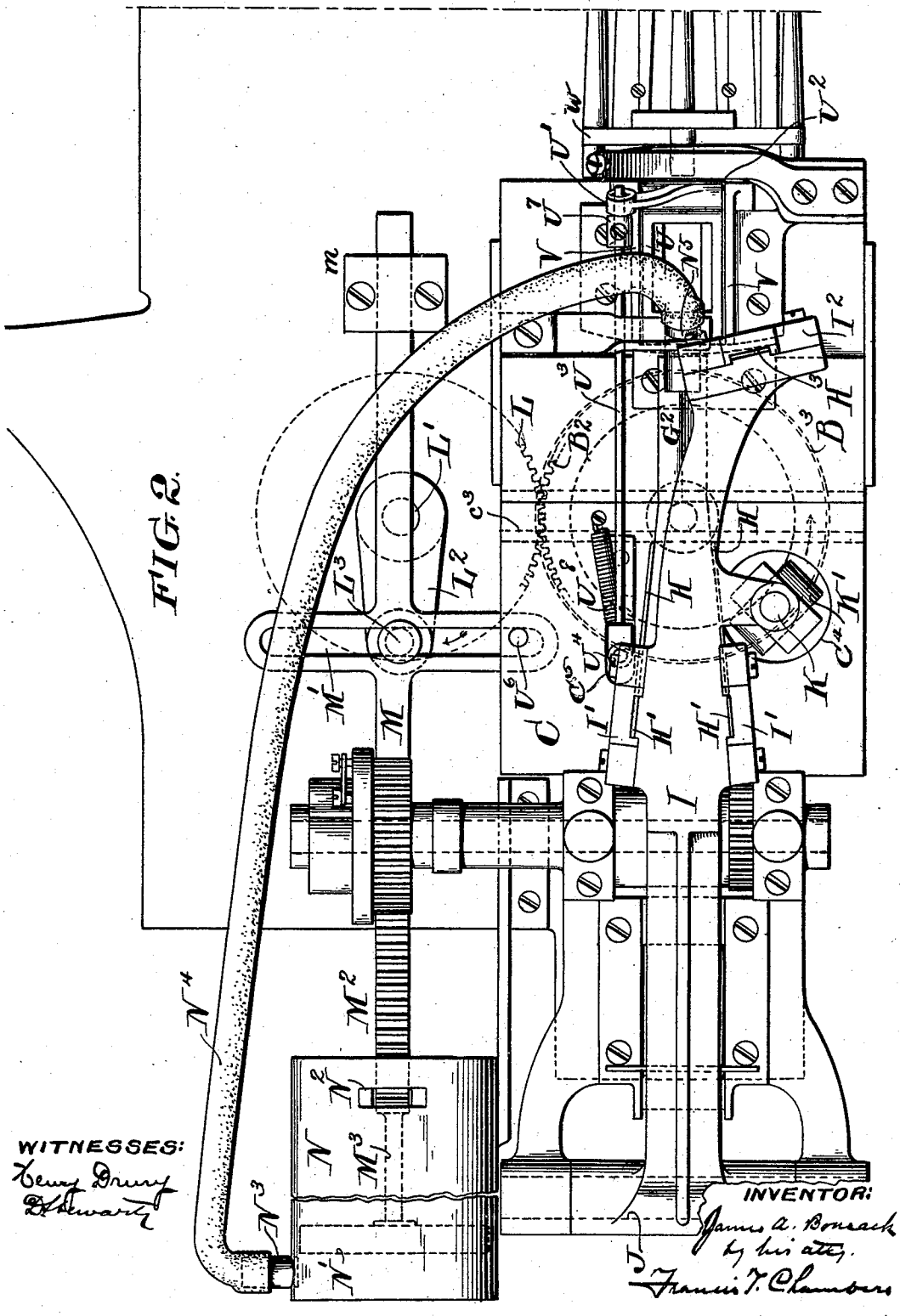
(No Model.) 6 Sheets—Sheet 2.

J. A. BONSACK.

APPARATUS FOR CUTTING CIGARETTE BLANKS.

No. 566,054. Patented Aug. 18, 1896.

FIG. 2.



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(No Model.) 6 Sheets—Sheet 3.

J. A. BONSACK.

APPARATUS FOR CUTTING CIGARETTE BLANKS.

No. 566,054. Patented Aug. 18, 1896.

FIG. 3.

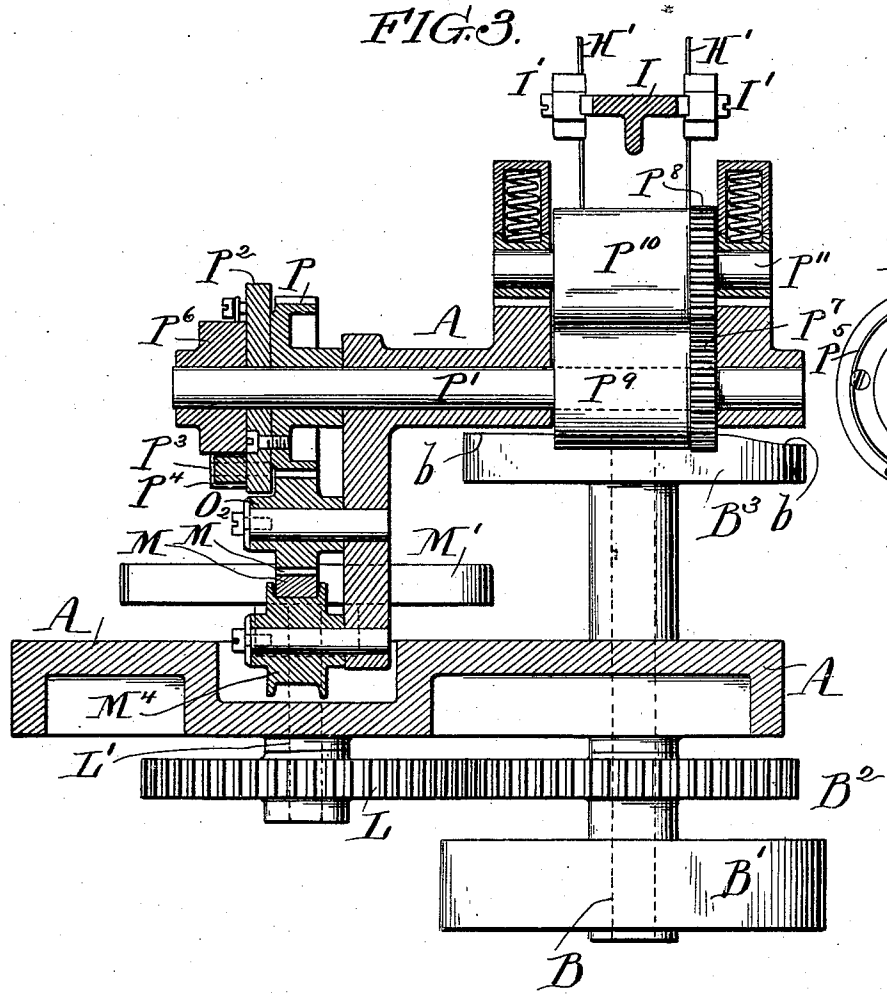
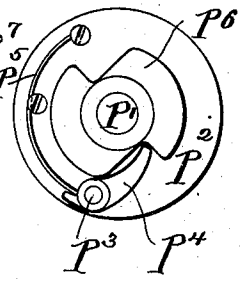


FIG. 4.



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J. A. BONSACK.

APPARATUS FOR CUTTING CIGARETTE BLANKS.

No. 566,054. Patented Aug. 18, 1896.

FIG. 6.

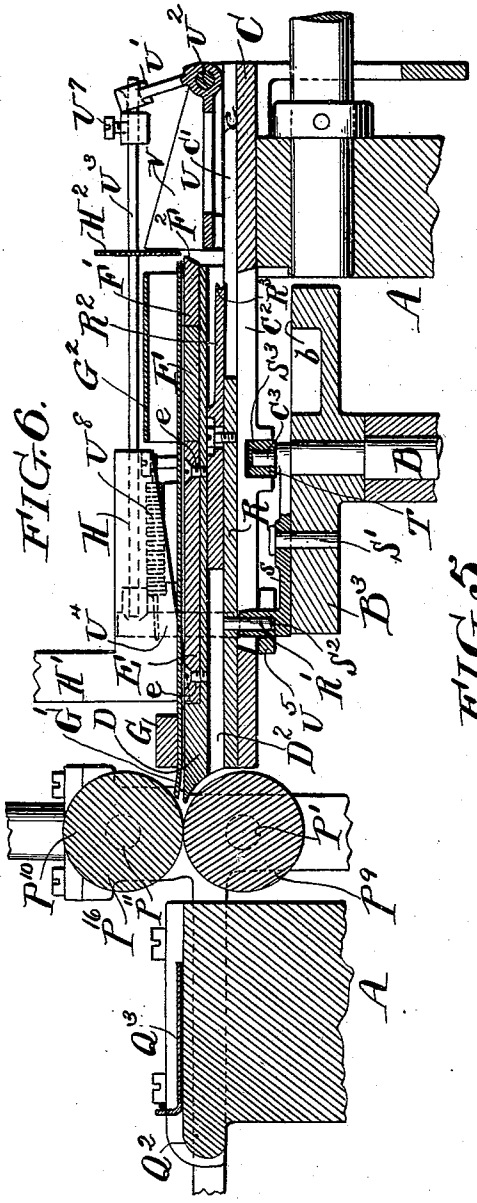
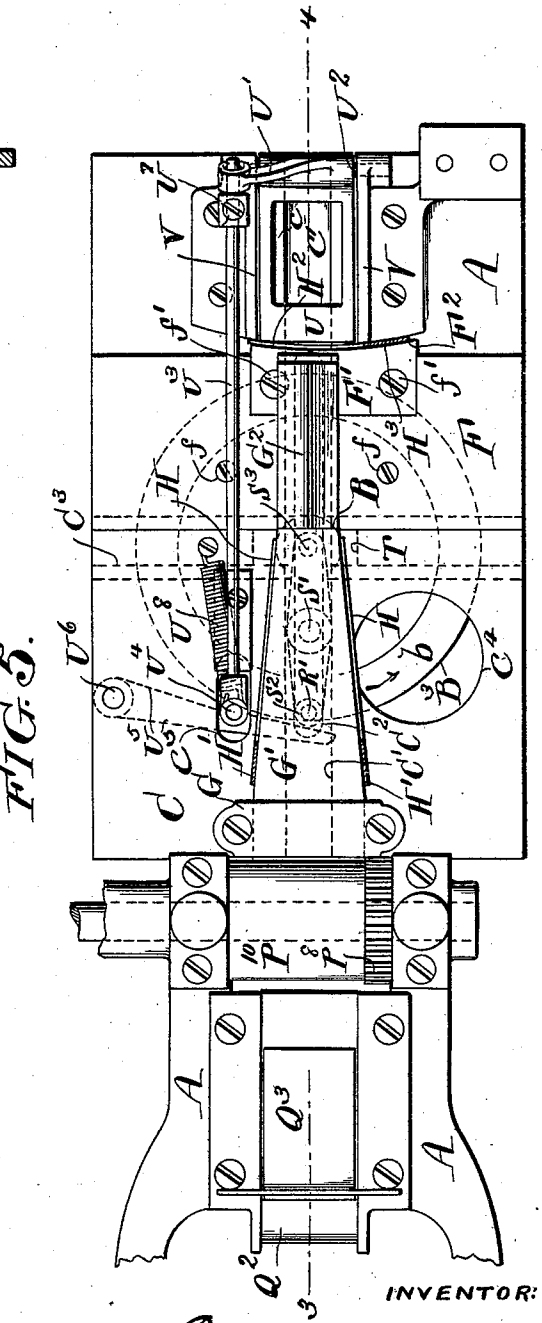


FIG. 5.



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APPARATUS FOR CUTTING CIGARETTE BLANKS.

No. 566,054. Patented Aug. 18, 1896.

FIG. 7.

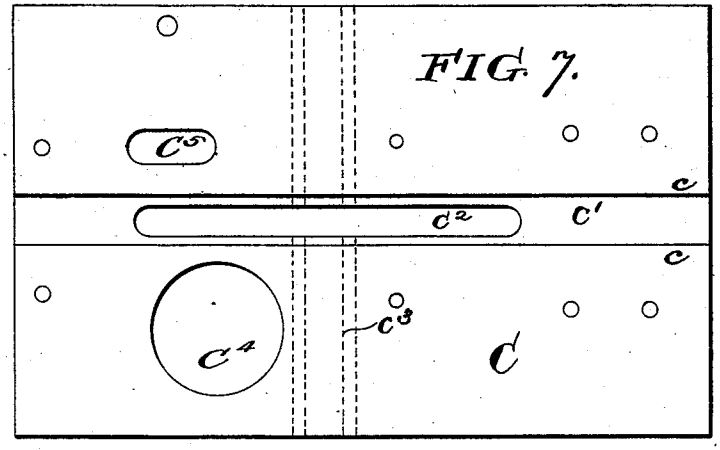


FIG. 8.

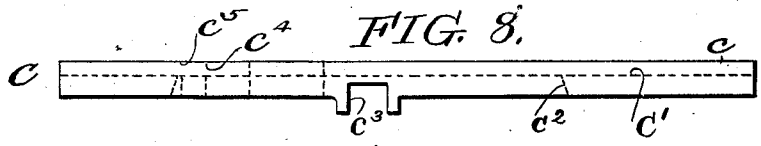


FIG. 17.

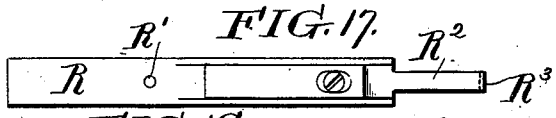


FIG. 18.

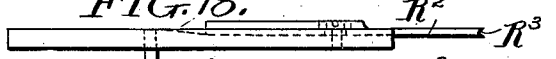


FIG. 15.

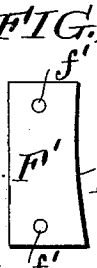


FIG. 9.

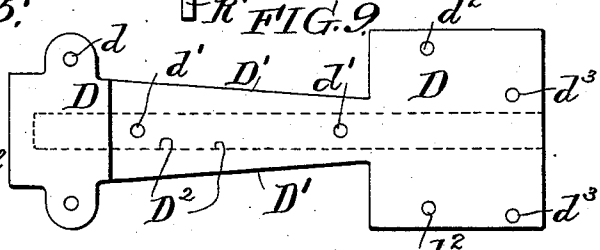


FIG. 13.

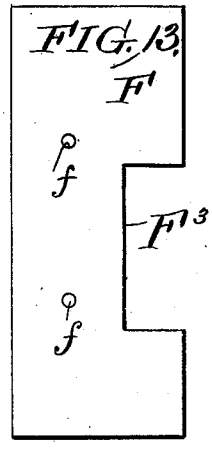


FIG. 10.

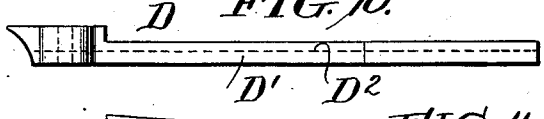


FIG. 16.

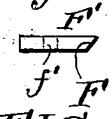


FIG. 11.

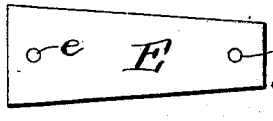
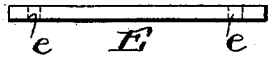


FIG. 14.

FIG. 12.



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J. A. BONSACK.

APPARATUS FOR CUTTING CIGARETTE BLANKS.

No. 566,054. Patented Aug. 18, 1896.

FIG. 19.

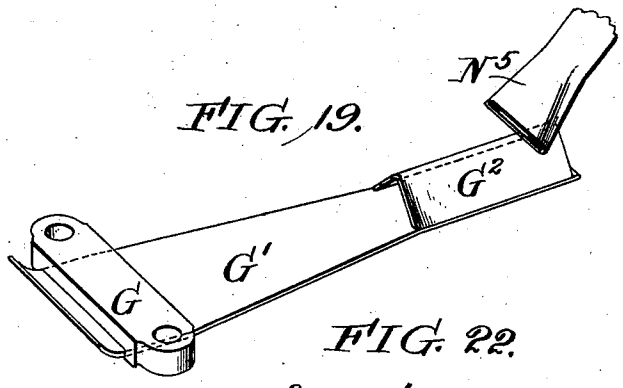


FIG. 22.

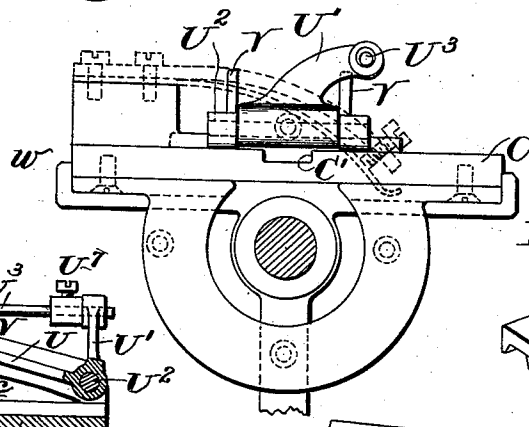


FIG. 20.

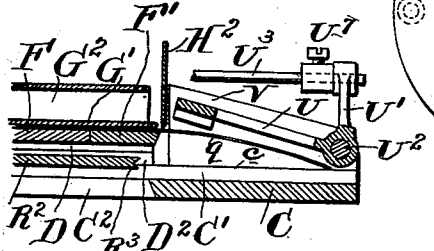


FIG. 23.

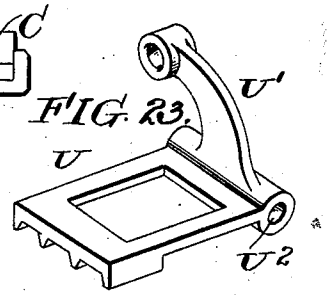


FIG. 21.

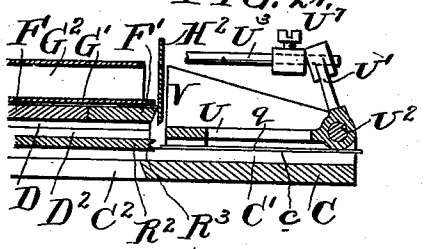


FIG. 25.

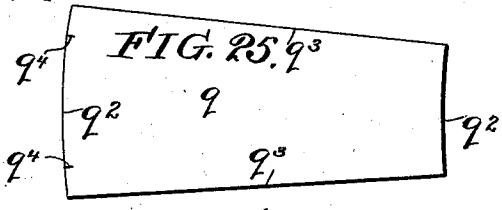


FIG. 26.

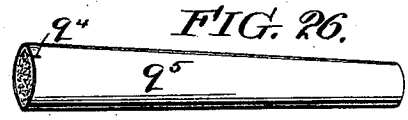
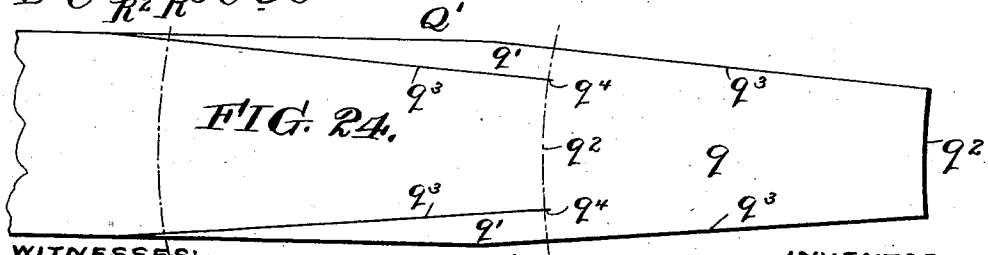


FIG. 24.



WITNESSES:

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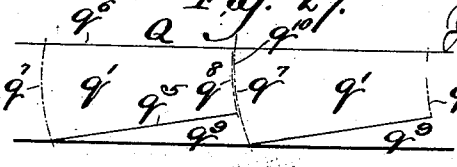
D. Stewart

FIG. 27.



INVENTOR:

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

UNITED STATES PATENT OFFICE.

JAMES A. BONSACK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE BONSACK MACHINE COMPANY, OF SALEM, VIRGINIA.

APPARATUS FOR CUTTING CIGARETTE-BLANKS.

SPECIFICATION forming part of Letters Patent No. 566,054, dated August 18, 1896.

Application filed April 28, 1893. Serial No. 472,228. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BONSACK, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and Improved Apparatus for Cutting Cigarette-Blanks, reference being had to the accompanying drawings, which form a part of this specification.

It is the object of my invention to provide an improved apparatus or machine by which blanks of a tapered shape, and thereby especially adapted for conical cigarette tubes or wrappers, are economically and quickly formed from long strips of paper or similar material.

The nature of my invention will be best understood as explained in connection with the accompanying drawings, in which it is illustrated, and in which—

Figure 1 is a side elevation of a machine embodying the novel features of my invention. Fig. 2 is a plan view of the same; Fig. 3, a cross-section on the line 1 2 of Fig. 1; Fig. 4, a face view of the clutch shown in Fig. 3. Fig. 5 is a plan view of working parts of the apparatus with the knife and knife-holding mechanism removed. Fig. 6 is a longitudinal section on the line 3 4 of Fig. 5. Fig. 7 is a plan view of the base-plate C. Fig. 8 is a side elevation of said plate. Fig. 9 is a plan view, and Fig. 10 a side elevation, of the plate over which the paper is fed to be cut and which supports plates E, shown in plan and elevation in Figs. 11 and 12, and the plates F and F′, shown in plan and elevation in Figs. 13, 14, 15, and 16. Fig. 17 is a plan view of the pushing device used to feed the several blanks. Fig. 18 is a side elevation of the same. Fig. 19 is a perspective view of the stripper-plate and air-blast nozzle; Figs. 20 and 21, elevations taken on the same section line as Fig. 6, showing the action of the jaw used to bring the blanks in front of the pusher. Fig. 22 is a back view of said jaw and immediately connected mechanism; Fig. 23, a perspective view of the jaw. Fig. 24 is a plan view of the strip of paper, illustrating the method of cutting blanks therefrom. Fig. 25 is a plan view of a severed blank. Fig. 26 is a perspective view of the conical cigarette made from the blank, and Fig. 27 a plan view illustrating a modification in the method of cutting the blanks.

To enable the special construction and operation of my improved apparatus to be more easily and readily understood, I will first state in a general way that its main features and operations consist in mechanism or devices by which a strip of paper of the desired width is fed or advanced intermittently to mechanism which cuts slits in the edges of the strip extending along its length, but slightly oblique or at an angle to its edges, and mechanism which cuts or severs the strip transversely of its length and across the oblique cuts or slits near the ends thereof, for the double purpose of removing the angular strips or sections which lie between the edges of the main strip and the oblique cuts, and also for dividing the main strip into lengths corresponding to the lengths of the cigarettes to be made.

Preferably, I provide mechanism which makes two oblique longitudinal cuts extending inwardly from the opposite edges of the strip, as shown at q^3 q^3 in Fig. 24, leaving the angular sections q' q' lying between the opposite edges of the main strip and the oblique cuts and attached to the partially formed preceding blank at their wider ends. The device which operates transversely to sever the blanks from the strip is preferably slightly circular in shape to give a corresponding shape to both ends of the blanks, which are cut and shaped by the same knife or cutter blade, so that when formed into tubes the ends of such tubes will be in a plane at right angles to their axes. A blank of this construction is shown in Fig. 25 of the drawings, and is indicated by q, its circularly-cut ends being indicated by q^2. It is noticed that the cut q^2, to insure the complete severing of the blank and its separation from the sections q', is made across the cuts q^3 at a slight distance behind their forward ends, leaving in the completed blank two short slits q^4, which are unobjectionable in the completed cigarette.

In the place of forming a blank q, as indicated in Figs. 24 and 25, by making two oblique cuts q^3 and cross-cuts q^2, a single longitudinal oblique cut may be made at a proper

angle to one of the edges of the strip and one or more cross or transverse cuts to sever the blank from the main strip. This modified construction is illustrated in Fig. 27 of the drawings, in which the blank is designated by q', the oblique cut by q^5, the cross-cuts by q^7 q^8, and the waste sections by q^9 and q^{10}. Instead of the two cross-cuts q^7 q^8, leaving the waste section q^{10}, a single cross-cut at substantially right angles to the central line of the blank q' may be made.

My apparatus further provides mechanism for depositing or laying the blanks after they have been severed from the main strip successively upon a table arranged in line with the table which supported the main strip at the time the blanks were cut, but upon a lower plane than the supporting-table, and it also provides mechanism for successively removing the completed blanks from said lower table.

I will now describe the special mechanism illustrated in the accompanying drawings, as follows:

A indicates the frame of the machine; B, the main driving-shaft set vertically in the frame and having, as shown, a driving-pulley B′, a spur-wheel B^2, and a cam B^3 attached to it. This cam B^3 is formed with a depression *b* on its upper face and is, as shown, a circular disk, the upper face of which forms the cam.

C is a plate secured to the frame of the machine in a horizontal position above the shaft B, and preferably formed, as shown, with a central groove C′ on its upper face, a slot extending through it along the center of said groove, as indicated at C^2, a transverse groove C^3 formed on its under face, and openings C^4 and C^5, the purpose of which will hereinafter be explained. It will be noticed that the center of the shaft B is in line with the point at which the grooves C′ and C^3 cross each other.

D is a plate formed with a groove D^2 along its under surface, the plate being secured to the top of the plate C so that said groove will register with the groove C′.

d *d′* d^2 d^3 indicate bolt-holes through which extend the bolts or screws which secure the plate D to the plate C and the plates E, F, and F′ to the plate D. The plate E is a steel plate, the side edges of which converge toward each other on the lines in which the blank is to be cut. It is secured to the plate D so that its edges will correspond with or slightly overhang the angular edges D′ D′ of the plate, screw-holes *e* being formed in the plate E, which register with holes *d′* *d′* in the plate D. The plate F fits upon the front or right-hand end of the plate D, and is secured to it by means of screws inserted in holes *f*, which register with the holes d^2 in the plate D. This plate F has a recess, as shown, F^3, into which fits the steel cutting-plate F′, the front edge F^2 of which has the outline of the transverse cut to be made in severing the blank. The plate D with the plates E, F, and F′ constitute the supporting-surface upon which the strip of paper lies while being operated upon by the cutters, and I refer to it hereinafter as a table.

G indicates a cross-bar of the machine, to which is attached what I call the "stripper-plate" G′. This plate for a portion of its length has substantially the outline of the plate E and lies immediately above it, the paper being fed between the stripper-plate and the table of which E forms a part. The outer extremity of the stripper-plate supports an angular deflector, (shown at G^2,) the purpose of which will be hereinafter explained, while its opposite end is preferably in close proximity to the periphery of the upper roller of the feed-rollers P^9 and P^{10} and operates to guide the paper strip away from such roller.

H H indicate the knives which make the angular longitudinal slits in the strip of paper. The edges of these knives register with and cut against the edges of the plate E, and they are attached to shanks H′, which in turn are secured by clamps I′ to a plate I, which, as shown, is made in the form of a lever pivoted at J. This plate I also supports and operates the transverse knife H^2, which cuts against the edge F^2 of the plate F′ and has its shank H^3 attached to the lever I by a clamp I^2.

In the arrangement shown in Figs. 1, 2, 5, and 6 of the drawings it is seen that the two oblique side cuts to partially form one blank are made at the same time with the transverse cut which severs the second blank in advance of the one in which the side cuts are made. In other words, a partially-formed blank lies between the blank operated on by the oblique side knives and the blank which is at the same time severed by the transverse acting knife. The transverse knife is located the distance of a blank in advance of the oblique or side knives in order that it may sever the blank along a line slightly back of the ends of the cuts formed by the oblique knives, and this could not be accomplished unless a blank intervened between the forward ends of the side knives and the transverse knife. The stripper-plate G′ operates to hold the paper strip down upon the table as the knives H, H, and H^2 are retracted.

The up-and-down motion of the plate I, which secures the action of the knives attached thereto at proper intervals, is effected by the cam B^3, a standard K extending down from the lever or plate I, and having a cam-roller K′ on its lower end, which rests upon the cam-surface of the cam B^3, the cam-roller, as shown, extending through the opening C^4 of the plate C.

Having referred to an angular deflector G^2, I will next explain its function and that of its coacting mechanism. The gear-wheel B^2 on the shaft B is engaged with a gear-wheel L, secured to a shaft L′, (see Fig. 2,) to which is attached also a crank L^2, the crank-pin L^3 of which moves in a slot M′ formed in a rod M,

supported on one end in a bearing *m* and having at its other end (indicated at M^3) a piston N′, working in an air-pump cylinder N, the cylinder of which has a delivery-nozzle N^3, to which is attached an air-hose N^4, upon the end of which is secured a blast-nozzle N^5, arranged obliquely above the deflector G^2, as indicated in Figs. 1 and 19. The gearing of the apparatus is such as to thrust the rod M forward into the cylinder N, forcing a current of air by means of the piston N′ to issue from the cylinder and through the nozzle N^5 at the time when the knives are in operation. As the force of the blast is exerted as the waste strips are severed and is deflected on each side by the deflector G^2, it strikes and carries away the triangular strips *q′* as they are severed from the strip.

In the arrangement shown I also utilize the rod M to give motion to the feed apparatus by providing the rod along a portion of its upper face with a rack-face M^2 and preferably supporting this part of the rod upon a loosely-journaled grooved wheel M^4. (Best shown in Fig. 3.) The function of this rack is to give an intermittent motion to the feed-rolls P^9 and P^{10}, this feed being timed to occur when the knives are raised above the table upon which the strip of paper lies, and the feed-rolls remaining stationary while the cutting operation is going on. In the special arrangement shown the rack M^2 is in engagement with a loosely-journaled pinion O, which in turn engages a spur-pinion P, journaled on a shaft P′, to which is attached the lower feed-roll P^9, the upper feed-roll P^{10} being rotated by the lower feed-roll by the engagement of the gears P^7 and P^8. A clutch mechanism is provided by which the rotation of the gear P in one direction turns the shaft P′, while its rotation in the other direction takes place upon the shaft without turning it. As shown, the plate P^2 is secured to the face of the gear P and has projecting from it a pin P^3, upon which is pivoted a pawl P^4, (see Fig. 4,) this pawl being normally thrown inward by the action of a spring P^5 upon its shank. To the end of the shaft P′ is attached a toothed segment P^6, the teeth of which, as indicated in Fig. 4, are engaged by the pawl P^4 when the plate P^2 is turning in one direction, while the pawl rides over the teeth readily when turning in the opposite direction, the roll P^{10} being pressed against the roll P^9 by means of journal-springs, thereby preventing the shaft P′ from rotating in the wrong direction. The strip of paper being operated upon is indicated at O′, Fig. 1, and is carried from a roll Q over a curved plate O^2 and under a guide O^3 to the bite of the feed-rolls P^9 P^{10}, and then by the action of the feed-rolls is fed over the table intermittently, remaining stationary while the knives H, H, and H^2 operate upon it.

Referring next to the mechanism for conveying the completed blanks away from the cutting mechanism, R (best shown in Fig. 6) is a slide fitting and moving in the slot C′ of the plate C and having, as shown, a downwardly-projecting pin R′, which extends through the slot C^2 in said plate. To the upper face of the slide R is adjustably attached a pusher R^2, which, as shown, moves in slot D^2 of the plate D and is formed with a grooved front end, as indicated at R^3, said end lying partly above and partly below the upper surface of the plate C, or that portion of it which I have indicated in Figs. 5 and 6 by the letter *c*. Reciprocating motion is given to the slide R and its attached pusher or finger R^2 in any convenient way, preferably as shown, however, by the parallel motion device actuated by the shaft B. This consists of a crank-pin S′, which, as shown, is fastened in the cam B^3 and has pivoted upon it the lever S, one end of this lever being pivotally attached at S^3 to a slide T, moving in the transverse slot C^3 of the plate C, while the other end of the lever S is pivotally attached to the plate R, as shown, by means of the downwardly-extending pin R′, which fits into a hole S^2 in the end of lever S. This arrangement of devices effects the proper reciprocating motion of the slide R, causing it to engage the blank at the proper time and also to move out of the way of the succeeding blank.

To refer next to the mechanism which brings the severed blank to position in which the pushing-finger R^2 can operate upon it, it will be noticed that the table which supports the strip of paper is at some distance above the pushing-finger, consequently when the blank is severed on the edge F^2 of the plate F′ it is necessary to carry it down to what I will call a "table" *c*, although, as shown, this so-called "table" is simply the front end of the plate C. The partially-formed blank on the front end of the strip of paper just before it is severed to form a completed blank is thrust by the feed-rolls over the edge of the plate F′ and between two guide-plates V V, rising on each side of the table *c*.

U is a plate, preferably formed, as shown, like a jaw, pivoted at U^2, which, when the paper is fed forward, is in the elevated position, (indicated in Fig. 20,) but which moves downward, following the motion of the knife H^2, and carries the severed blank down upon the table *c* and directly in front of the pushing-finger R^2, as indicated in Fig. 21. This jaw U in the construction shown is formed with an upwardly-extending arm U′, through an opening in the end of which passes a rod U^3, attached at its other end to a standard U^4, extending down through the opening C^5 in the plate C and attached at its lower end to a lever U^5, which lever is pivoted at U^6 and has its free end extending in the path of the end S^2 of the lever S. A spring U^8 is connected with this mechanism, as shown, being attached to the standard U^4 and the plate C in such a way as normally to thrust the rod U^3 backward toward the lever-arm U′, an adjustable collar U^7 pressing against said lever-arm and raising the jaw U, as indicated in

Fig. 20. The action of this spring is also to hold the free end of lever U^5 in contact with the end S^2 of the lever S. When the said lever U^5 is pushed back by the end of the lever S, it permits the plate U to fall or close down, as indicated in Fig. 21, while obviously as the slide R and pushing-finger R^2 move forward the end S^2 of the lever S moves in the same direction, permitting the spring U^8 to raise the jaw in advance of the motion of the finger toward it and in time to receive the next blank beneath it.

The parts of the machine shown in the drawings indicated at *w*, Figs. 1, 2, and 22, have nothing to do with the severing of the blank, but relate to further operations performed upon it, and form no part of my present invention and need not further be described in this patent.

The following is a brief statement of the general operation of the machine as hereinbefore specifically described, and shown in the drawings: The strip of paper Q′ is drawn from the roll Q by the intermittent rotation of the feed-rollers P^9 and P^{10}, and is advanced to the cutting-knives along a channel whose under wall is composed of the upper surfaces of the plates D, E, F, and F′, and whose upper wall is the under surface of the stripper-plate G′. The knives H H fall and rise vertically nearly in line with the edges of the plate E, along which they cut oblique longitudinal slits in the opposite edges of the paper strip, while the knife H^2, which falls and rises nearly in line with the edge F^2 of the plate F′, cuts the strip transversely to form the forward and rear ends of the blanks, the stripper G′, both at its edges and at its forward end, acting to hold the paper strip in place as the knives are raised. A blast of air directed by a deflector G^2 blows the waste scraps of paper from the cutting-table. The severed and completed blank is lowered from the cutting-table upon the table *c* by the action of a hinge-plate U, and is then pushed along this table by a reciprocating sliding pusher R^2, the motions of the plate U and the pusher R^2 being such that as the plate U rises the pusher advances and as the plate falls the pusher recedes.

I claim—

1. In an apparatus for forming blanks for cigarette tubes or wrappers from strips of paper or similar material, the combination of the following mechanisms: feeding mechanism constructed and operating to intermittently feed or advance the strip to cutting mechanisms; cutting mechanism constructed and arranged to form oblique longitudinal cuts or slits in the opposite edges of the strip, such cuts being inclined toward each other; a cutting mechanism constructed and arranged to sever the paper strip transversely of its length and across the oblique cuts for the purpose of removing the angular sections or strips which lie between the edges of the main strip and the oblique cuts and of dividing the strip into blanks whose length shall correspond to the length of the ultimate cigarette.

2. In a machine for cutting cigarette-blanks from paper strips, the combination with mechanism for intermittently feeding the strip, of a table for supporting the strip as it is fed forward, knives constructed and arranged to cut longitudinal oblique slits in the opposite edges of the strip, and a simultaneously-acting knife constructed and arranged to sever the strip transversely of its length and across the oblique slits to remove the angular sections and form cigarette-blanks of determined lengths.

3. In a machine for cutting cigarette-blanks from paper strips, the combination with intermittently-acting feed mechanism, of a table arranged to support the paper strip as it is fed forward, knives operating in conjunction with said table to cut from the paper strip blanks of tapered form adapted for conical tubes, a table *c* arranged in line with and out of the plane of said strip-supporting table, mechanism acting to deliver the severed blank down upon said table *c* and feeding mechanism adapted to engage and carry the blank along over said table *c* and arranged to operate intermittently with the said delivering mechanism to remove a blank from underneath the delivering mechanism before a succeeding blank is laid on the table *c*.

4. In a machine for cutting cigarette-blanks from paper strips, the combination with mechanism for intermittently feeding a strip of paper, of a table arranged to receive and support the strip, one or more knives set at an angle with the edges of the paper strip and adapted to cut inclined slits therein, a transversely-extending knife arranged to sever the blanks, and an intermittently-acting air-jet mechanism arranged to deliver a jet of air to blow away the triangular strips or sections as they are cut from the main strip by the transverse knife and to intermit its blowing action while the main strip is fed forward.

5. The combination with the mechanisms for feeding and cutting cigaratte-blanks from a strip of paper, jet mechanism acting when the transverse knife descends to blow away the strips cut from the blank, and a stripper-plate G′ provided with a deflector G^2 acting to hold the strip in position and to direct the blast unto the parts of the strip cut away.

6. In a machine for cutting cigarette-blanks having knives and means for intermittently actuating said knives to sever blanks from a strip of paper, the combination of a pair of feed-rolls P^9 P^{10}, a reciprocating rack M^2 arranged as described, to actuate the rolls when moved in one direction, and actuated so as to move the feed-rolls when the knives are out of operation, an air-pump cylinder placed in line with the rack, a piston in said cylinder secured to and actuated by the rack so as to compress the air during the return stroke of the rack after moving the feed-rolls, and an

air-nozzle connected with the pump and arranged as described with reference to the knives.

7. In a machine for cutting cigarette-blanks from paper strips, the combination, with a table arranged to support the paper strip as it is fed forward, of a movable plate I, knives H H operating to cut longitudinal oblique slits in the opposite edges of the strip, a knife H^2 operating to sever the strip transversely and located in advance of the knives H H the length of a blank, a stripper-plate G′ extending from the rear ends of the knives H H to the knife H^2, and mechanism for giving the desired upward and downward movement to the plate I.

8. In a machine for cutting cigarette-blanks, the combination of the base-plate C, a paper-supporting table as E, F, F′, supported above said table, a blank-feeding slide as R, R^2 moving on plate C below the table, a rotating shaft B, a device for converting rotating to reciprocating motion connecting shaft B and the slide, knives H H H^2 arranged to sever the blanks from the paper strip and means for actuating said knives driven by shaft B.

9. In a machine for cutting cigarette-blanks, the combination of the base-plate C having a longitudinal slot C^2 and a transverse groove C^3 formed in it, a blank-feeding slide R R^2 moving in guides on the top of plate C and over slot C^2, a shaft B situated below and at right angles to plate C, a crank-pin S′ connected to said shaft, a slide S^3 movable in groove C^3, a lever R pivoted at its center to pin S′ and at one end to slide S^3 and at its other end to slide R, a paper-supporting table supported on plate C above slide R, knives arranged to act on the paper, means for communicating motion from shaft B to said knives.

10. In a machine for cutting cigarette-blanks, the combination of the base-plate C having a longitudinal slot C^2 and a transverse groove C^3 formed in it, a blank-feeding slide R R^2 moving in guides on the top of plate C and over slot C^2, a shaft B situated below and at right angles to plate C, a crank-pin S′ connected to said shaft, a slide S^3 movable in groove C^3, a lever R pivoted at its center to pin S′ and at its other end to slide S^3, a paper-supporting table supported on plate C above slide R, knives arranged to act on the paper, means for communicating motion from shaft B to said knives, a hinged jaw U having a lever-arm U′ arranged to bring the several blanks in line with slide R R^2, a rod V^3, a lever U^5 to which rod V^3 is secured at one end, said lever being pivoted at V^3 and having its other end in the path of lever S, and a spring V^8 arranged to normally thrust rod V^3 forward to move jaw V, said jaw being permitted to fall when the lever V^5 and rod V^3 are drawn back by the action of lever S on lever V^3, all substantially as described.

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Witnesses:
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