

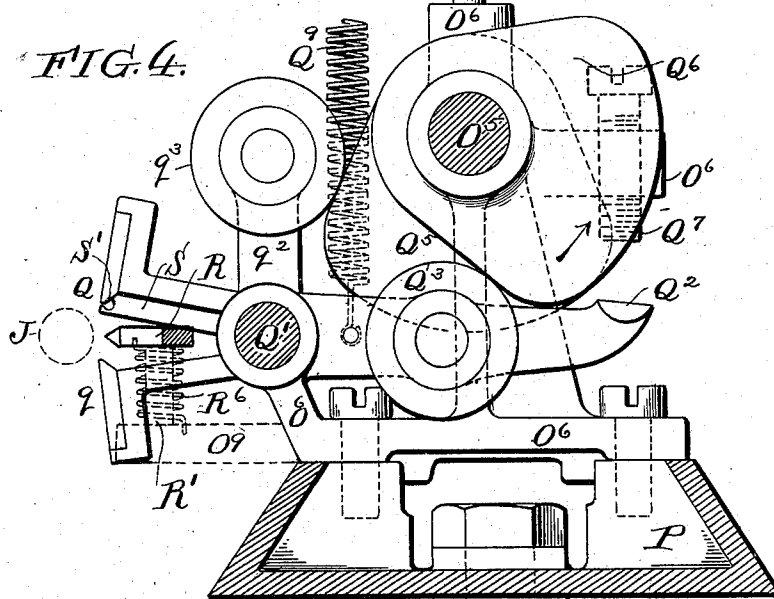
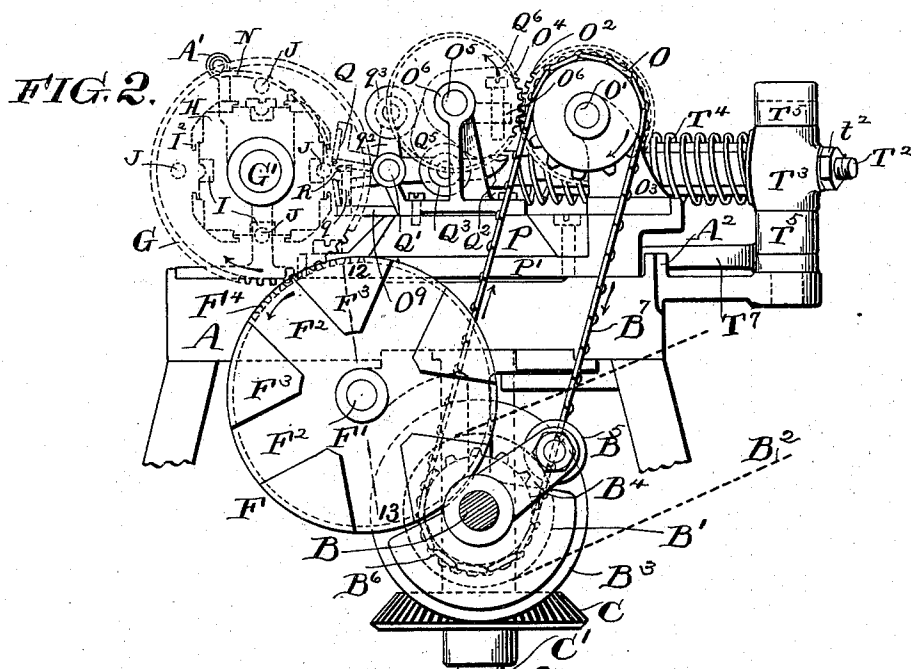
(No Model.)

7 Sheets—Sheet 2.

J. A. BONSAK.
CIGARETTE TUBE MACHINE.

No. 565,853.

Patented Aug. 11, 1896.



WITNESSES:

Henry D. May
J. Russell.

INVENTOR:

Ist James A. Boueack
by his atty.
Francis J. Chambers

(No Model.)

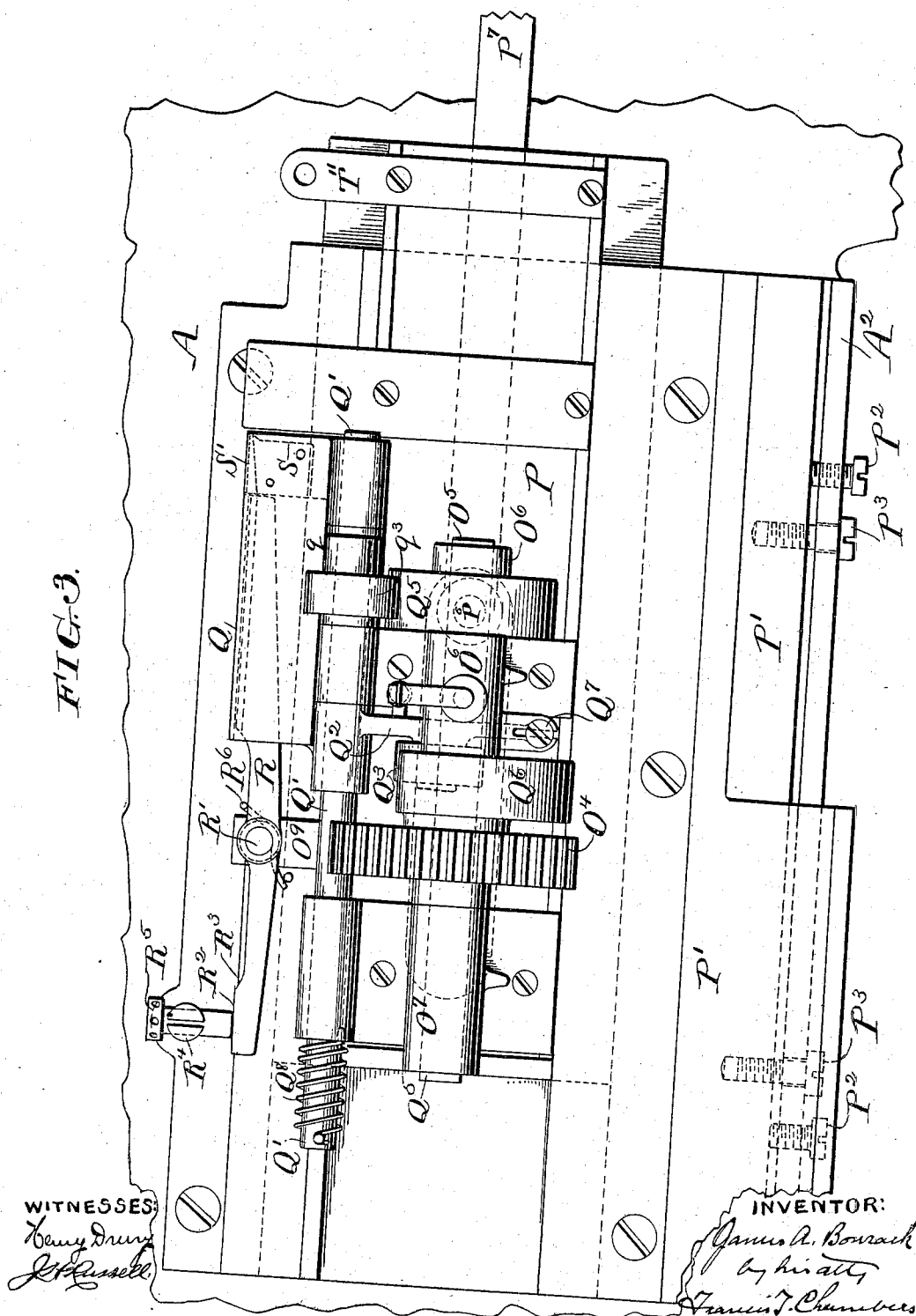
7 Sheets—Sheet 3.

J. A. BONSAK.
CIGARETTE TUBE MACHINE.

No. 565,853.

Patented Aug. 11, 1896.

FIG. 3.



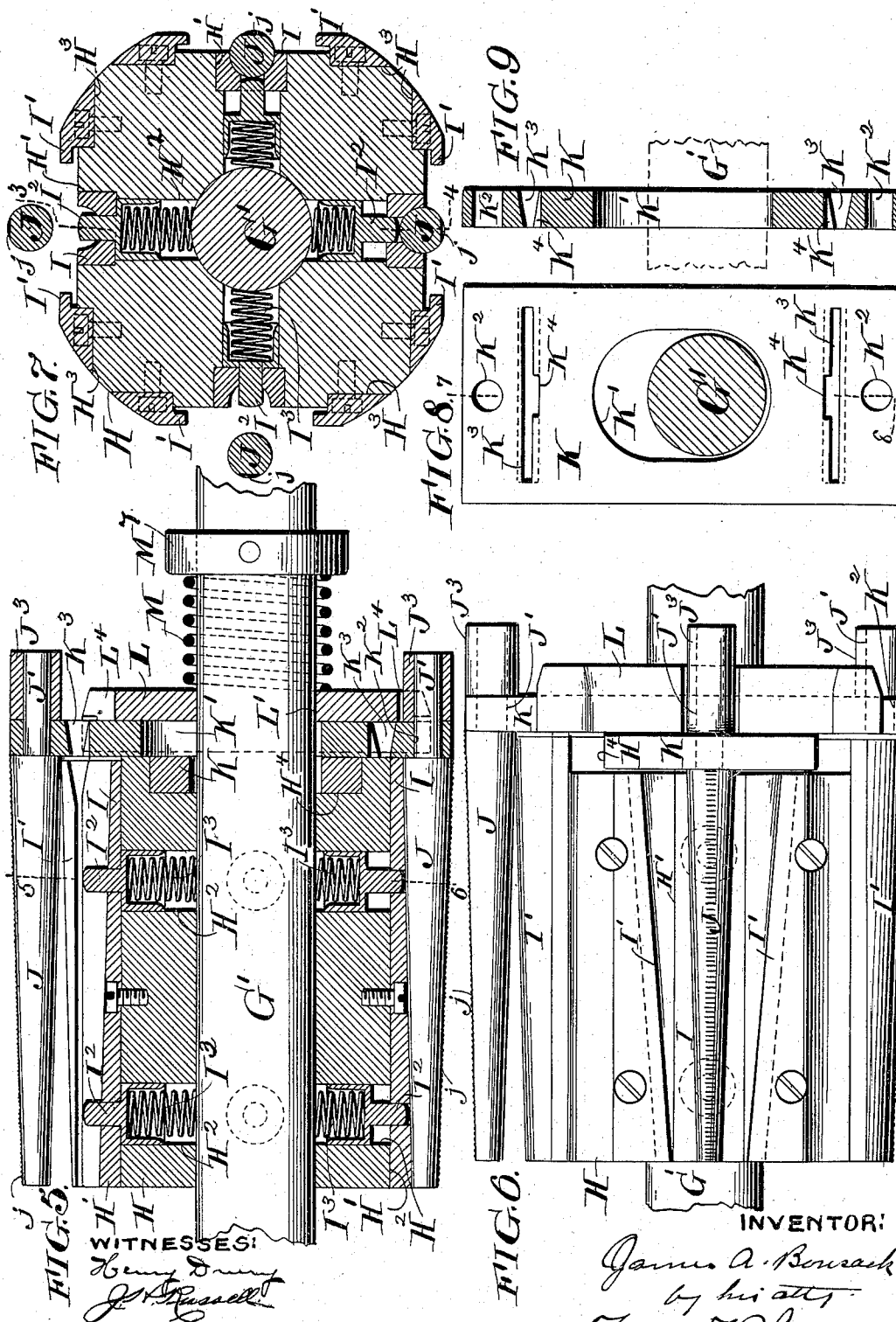
(No Model.)

7 Sheets—Sheet 4.

J. A. BONSAK.
CIGARETTE TUBE MACHINE.

No. 565,853.

Patented Aug. 11, 1896.



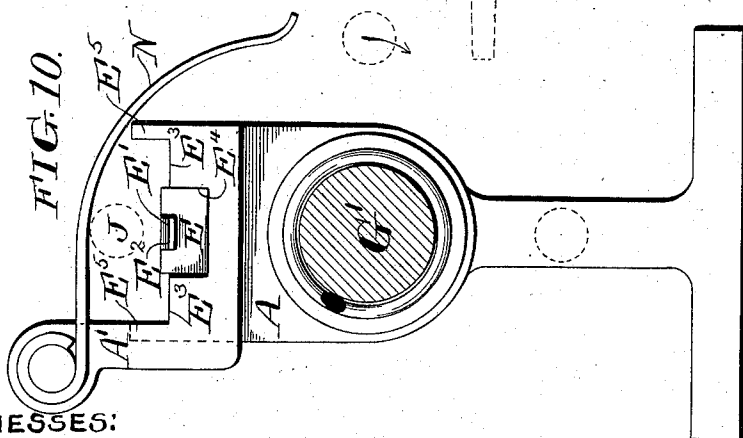
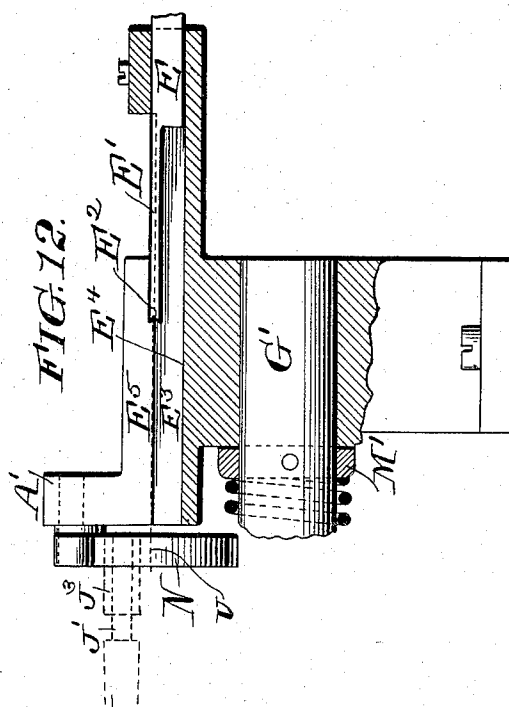
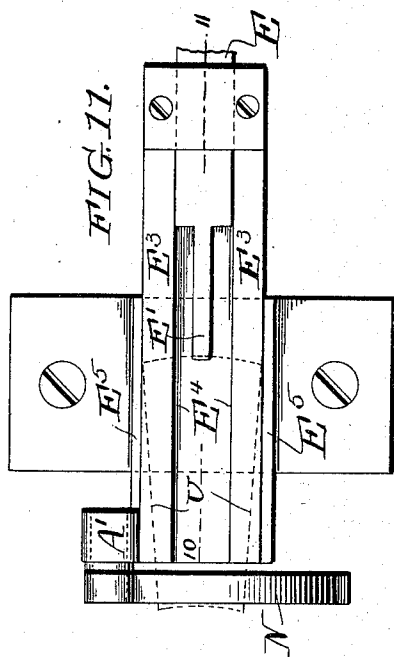
(No Model.)

7 Sheets—Sheet 5.

J. A. BONSAK.
CIGARETTE TUBE MACHINE.

No. 565,853.

Patented Aug. 11, 1896.



WITNESSES:

Henry D. May
J. Russell

INVENTOR:

James A. Bonsack
by his atty.
Francis J. Chambers

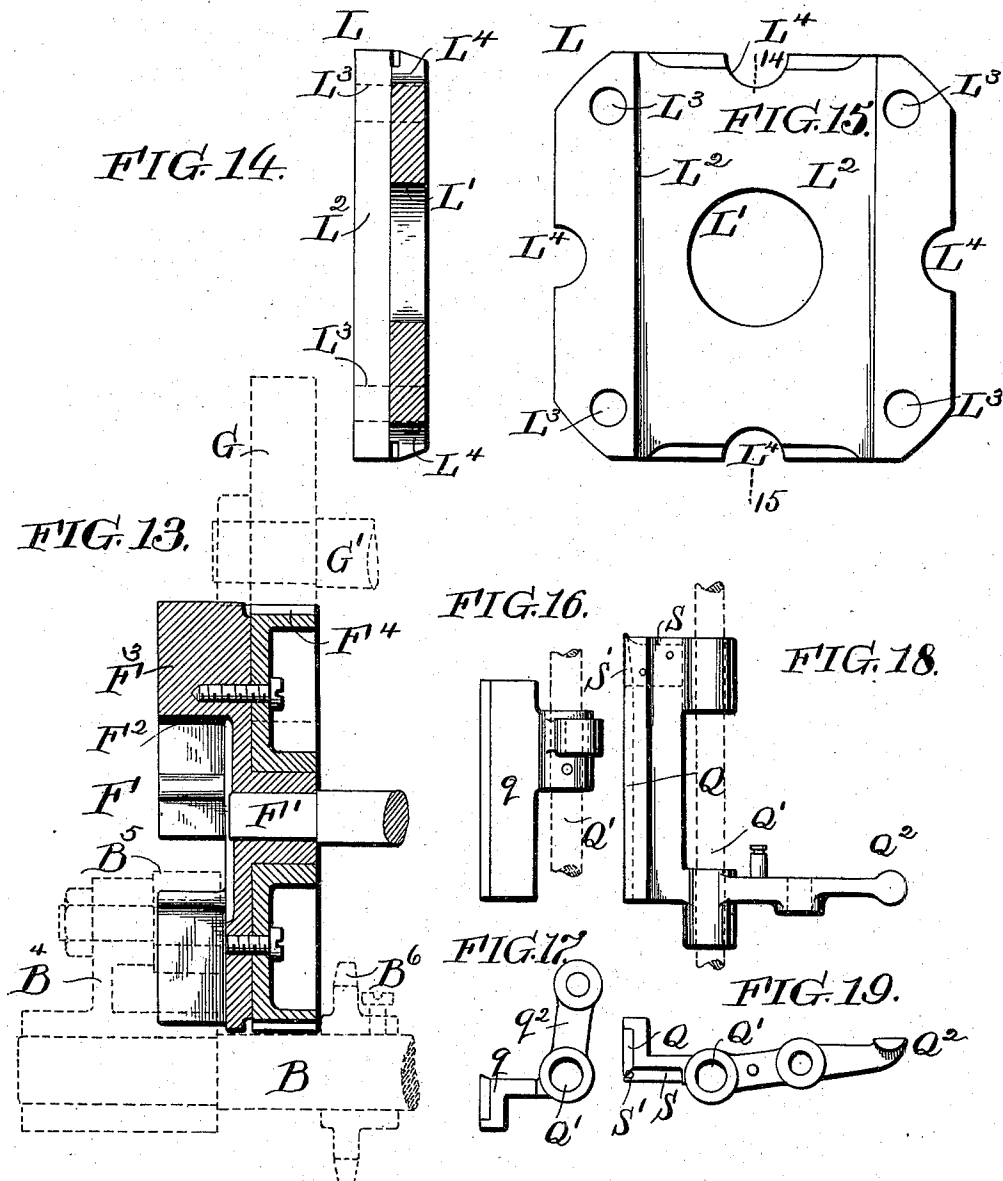
(No Model.)

7 Sheets—Sheet 6.

J. A. BONSAK.
CIGARETTE TUBE MACHINE.

No. 565,853.

Patented Aug. 11, 1896.



WITNESSES:

Henry Denny
J. Russell

INVENTOR:

James A. Bonsack
by his atty.
Francis T. Chambers

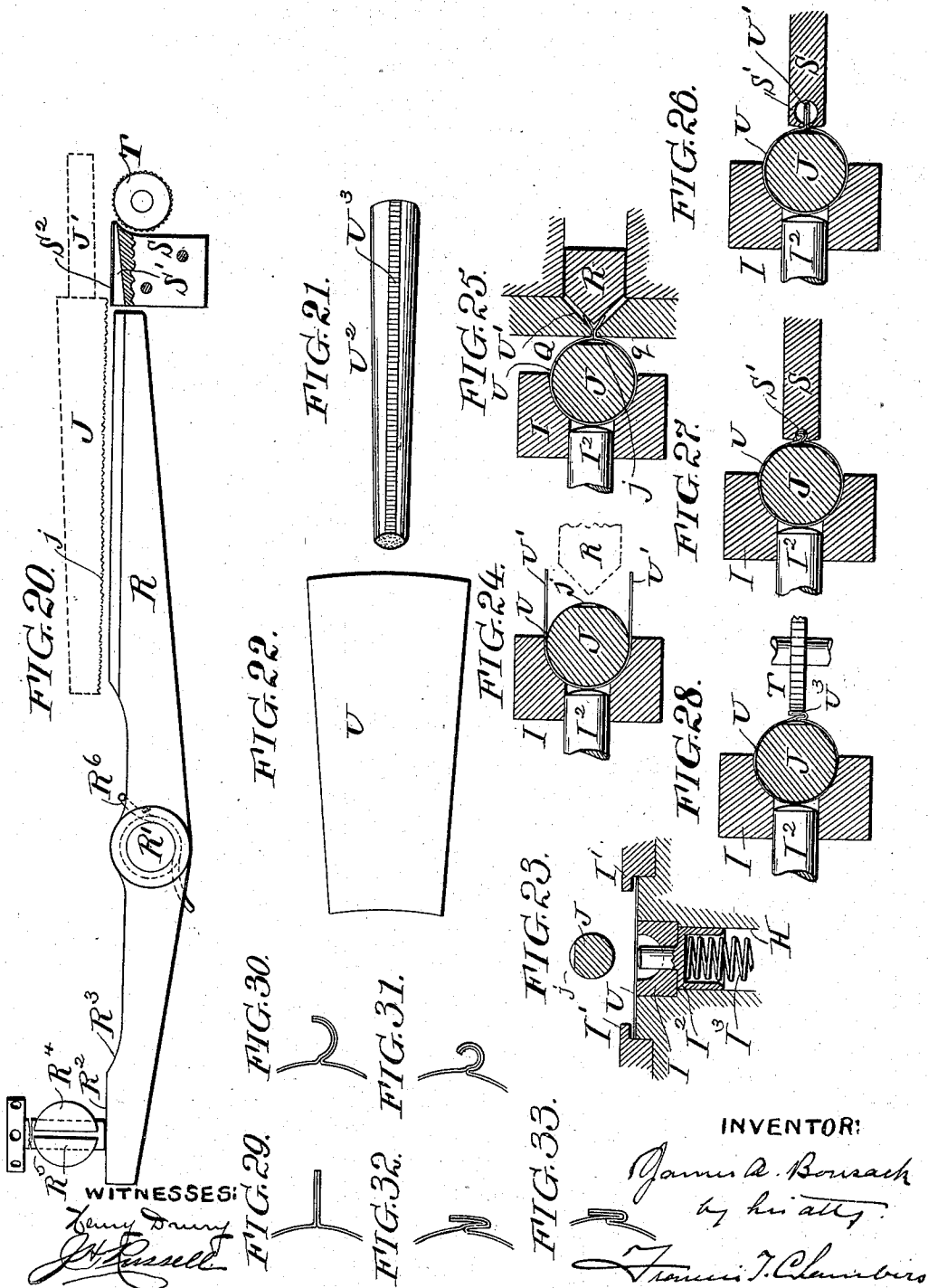
(No Model.)

7 Sheets—Sheet 7.

J. A. BONSAK.
CIGARETTE TUBE MACHINE.

No. 565,853.

Patented Aug. 11, 1896.



UNITED STATES PATENT OFFICE.

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

CIGARETTE-TUBE MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,853, dated August 11, 1896.

Application filed August 2, 1892. Serial No. 441,914. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BONSAK, of the city and county of Philadelphia, State of Pennsylvania, have invented a certain new and useful Improvement in Cigarette-Tube Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to that class of cigarette-tube machines in which a paper tube or cigarette-wrapper is made from a previously cut blank and preferably filled with tobacco after it is made.

The object of my invention is to provide improved mechanism for forming the tube and seaming its edges together; and my invention consists in improved mechanism for accomplishing the desired result.

The nature of my improvement will be best understood as described in connection with the drawings, in which I have illustrated both the operations performed upon the blank and the best mechanism which I have devised to perform those operations, and in which—

Figure 1 is a plan view showing the mechanism of that part of a cigarette-machine to which my invention relates. Fig. 2 is an end elevation of the machine viewed from the left-hand side of Fig. 1. Fig. 3 is a plan view, on an enlarged scale, of that portion of the mechanism shown in Fig. 1 which is carried by the slide. Fig. 4 is a cross-sectional view taken through the slide on the section-line 1 2 of Fig. 1 and showing in elevation the jaws and jaw-actuating mechanism. Fig. 5 is a longitudinal section through the matrix-holder on the line 3 4 of Fig. 7. Fig. 6 is a plan view of the matrix-holder; Fig. 7, a cross-section through the matrix-holder on the line 5 6 of Fig. 5. Fig. 8 is a plan view of one of the mandrel-holders; Fig. 9, a cross-section through the mandrel-holder on the line 7 8 of Fig. 8. Fig. 10 is an elevation, on an enlarged scale, taken on the section-line 9 9 of Fig. 1, showing the blank-holding table, the mechanism for feeding it to the matrices, and the device for moving the mandrels. Fig. 11 is a plan view of the mechanism shown in Fig. 10; Fig. 12, a longitudinal section on the line 10 11 of Fig. 11. Fig. 13 is a cross-sectional view, on an

enlarged scale, taken on the line 12 13 of Fig. 2. Fig. 14 is a view of the guide for the mandrel-holding slide, taken on the line 14 15 of Fig. 15. Fig. 15 is a plan view of said slide. Fig. 16 is a plan view, and Fig. 17 an end elevation of one of the paper-holding jaws; Figs. 18 and 19, similar views of the other paper-holding jaws. Fig. 20 is an elevation showing the paper-separating finger, and also, in section, what will hereinafter be called the "seamer." Fig. 21 is a perspective view of the completed cigarette-tube; Fig. 22, a plan view of the blank from which the tube is made. Figs. 23 to 28, inclusive, exhibit the process of making the cigarette and also the different instrumentalities acting upon the blank during the various steps of its conversion into a cigarette-tube; and Figs. 29 to 33, inclusive, illustrate the various operations performed upon the abutted edges of the paper to form the seam.

I will first describe the main steps or operations of my improved machine or mechanism for forming paper tubes, in order that the construction, arrangement, and operation of the several parts, as they are hereinafter fully described, and illustrated in the accompanying drawings, may be more easily and readily understood.

This machine is adapted to act upon previously cut blanks of the desired size and shape and to form each blank into a tube, preferably of conical form and ready to be filled with tobacco. The blank is first brought beneath a properly-shaped mandrel, and then acted upon by mechanism which forms it into a substantially U form throughout its entire length around the mandrel, preferably by a matrix arranged to coact with the mandrel, which latter, as shown, is alternately moved to and from the matrix, and I arrange grippers or fingers which hold or grip the blank in proper position against the mandrel when the mandrel is brought in contact with it and operates to carry or press it into the matrix, as shown in Figs. 23 to 26 of the drawings. The next instrumentalities acting upon the blank are arranged to fold the edges of the U-shaped blank over the uncovered part of the mandrel to form the blank into tubular shape, as shown in Fig. 25. These devices may be called "tube-closers,"

and they are arranged to bring the edges of the blank into abutting contact with each other, some device being provided which will prevent the edges from lapping over each other upon the mandrel and cause them to extend or project away from its face and from the body of the tube. Preferably I use tube-closers in the form of jaws which act upon the sides of the U-shaped blank, gripping them together at some distance inside the extreme edges, and I prevent these edges from lapping upon the mandrel by means of a finger, which, while the edges are closing to form the tube, lies close to the face of the mandrel, as shown in Figs. 24 and 25, and is afterward moved away to permit the extreme edges of the blank to come into abutting contact with each other, and thus form the preliminary seam of the tube, as shown in Figs. 26 and 29. Having formed the tube by the above mechanism, I next act upon the contacting edges of the blank, which constitute the preliminary seam of the tube, by folding them over upon themselves and upon the face of the mandrel to form a more substantial seam of an increased number of thicknesses or plies of paper, and this is done by means of a properly-formed seamer which moves along the mandrel and acts upon the preliminary seam as it is released from the closing jaws, as shown in Figs. 26 and 27. These jaws, when they close to bring the edges of the blank together to form the preliminary seam, do not grip or clamp the seam tightly, but leave it sufficiently free so that the jaws can be easily moved along its length without disarranging it, while at the same time the jaws are near enough together, and are held in that position by spring-pressure, to maintain the seam in form for the action of the seamer. The seamer which moves along the length of the seam directly behind the jaws receives and operates upon the preliminary seam, as it is presented from between the moving jaws, to fold it over upon itself to form a more substantial seam. After and preferably as soon as the seam has been folded down upon the mandrel it is secured by crimping. The device which is preferred for this purpose is a serrated wheel, which is arranged to move along the length of the folded seam and press it against the surface of the supporting-mandrel, the latter being preferably provided with a line of notches or serrations to coact with the serrated periphery of the crimping-wheel, as shown in Fig. 28. During the seaming and crimping operations the paper blank remains stationary on the mandrel.

The construction, arrangement, and operation of the various parts of my improved machine, with references to the accompanying drawings, are stated as follows:

A indicates the stationary frame of the machine, and B the driving-shaft thereof, to which motion is transmitted through a pulley (indicated in dotted lines at B', Fig. 2) which

is driven by a pulley-belt B² or in any other convenient way.

B³ is a miter-gear secured on shaft B (see Figs. 1 and 2) and engaging with miter-gear C, secured to an upright shaft C'.

C² is a gear-wheel secured to shaft C' and engaging a gear D, secured to shaft D', (see Fig. 1,) to which shaft is also secured a crank-arm D², which is connected by means of a connecting-rod D³ with a slide E, which is given a reciprocating motion as the shaft B revolves. The slide E is of course suitably guided, its front end moving in a guide-slot E⁴, formed in the paper-blank-holding table E³. (See Figs. 1, 10, 11, and 12.) At the end of the slide E is a notched finger E', placed at such an elevation that the notch will engage the edge of a blank resting upon the table E³, and as the slide moves forward push the blank forward off of the table onto one of the matrices which I am about to describe. The notch in the finger E is indicated by the letter E². (See Figs. 10 and 12.)

Returning now to the driving-shaft B B⁴ (see Figs. 1, 2, and 13) is a crank-arm carrying on its end a roller B⁵, which at each revolution of the shaft B passes into one of the channels F² of a star-wheel F, and, acting against the wall F³, separating the channels F², causes the wheel F to move through a certain arc of rotation. The star-wheel is secured to a shaft F', to which is secured a gear-wheel F⁴, Figs. 1 and 2, and this gear-wheel engages a gear-wheel G, which in turn is secured to a shaft G', suitably supported on the frame A, and to which is securely attached what I will call the "matrix-holder" II, the construction of which is best shown in Figs. 5 to 7.

The arrangement and character of the device already described for transmitting motion from the driving-shaft B to the shaft G' are such that for each revolution of the main shaft B the shaft G' will turn through a quarter-revolution, and the holder II is accordingly made with four faces, each of which, as shown, has formed in it a slot or cavity H', and in each slot is secured a matrix I, and on each side of this matrix, in properly-formed cavities H³, are secured guides I' I', which are in plane with the top of the matrix, and whose edges overhang such plane, the guides being located one on each side of the matrix and at a distance therefrom conforming to the shape of the paper blank. Through perforations in the bottom of the matrix I project fingers I², normally held, as shown in Figs. 5 and 7, so as to come flush with the top of the matrix, the fingers being supported in this position by means of springs I³, placed in cavities H² in the holder II.

J J, &c., are mandrels formed to fit in the cavities of the matrices I, the form, as shown and preferably used by me, being that of a truncated cone. These mandrels, of which there are one for each matrix, have a motion to and from their proper matrices, as well as an intermittent motion with the holder II, around

the shaft G', and constitute supports around which the blanks are formed into tubular shape and on which they are held while their edges are brought into abutting engagement and formed into a seam and secured by crimping. During the seaming and crimping operations, as well as in forming the blank into a U shape, the mandrels and the matrices coact to engage and hold the blank, and it is important that the matrices shall be fixed or unyielding to provide a rigid support for the mandrels when they are subjected to pressure from the seaming or crimping mechanisms.

The paper blank U is pushed lengthwise under the edges of the guides I' I' to over the matrix and properly centered and alined by means of the guides I'. The mandrel is then brought down upon the center of the blank, which is then gripped between what I will call the "inner face" of the mandrel and the fingers I², and thus prevented from slipping and getting out of alinement while the mandrel moves into the matrix, pressing the fingers before it and forming the blank into the U shape indicated in Fig. 24.

In the mechanism shown in the drawings the four mandrels arranged to coact with the matrices are secured to the two slides K, two mandrels being secured to each slide, and one of these slides moves in a guideway H⁴, (see Fig. 5,) formed in the holder H, while the other slide is arranged at right angles to it and is guided by a guide-plate L. (See Figs. 5, 14, and 15.) This guide-plate has a central opening for the passage of the shaft G', and is supported on pins projecting from the end of the holder and passing through holes L³ in the guide-plate. The plate L is free to move on the pins and is held against the outer slide K by a spring M, resting at its other end against a collar M' on shaft G', (see Fig. 5,) which spring has sufficient pressure upon the slides to hold them and their mandrels to whatever position they may be moved. The recesses L⁴, formed in the four sides of the guide L, are simply to make a clearance for the rollers J³, which are secured on the projecting ends J' of the mandrels.

To return to the slides K it will be noted that each of them is provided with an elongated opening where it passes over the shaft G', these openings being for the purpose of allowing the slides to move to carry the mandrels in and out of the matrix. Each has a perforation K² at each end, in which the projecting pin J' of the mandrels is secured, and is also provided with slots K³, which should be of tapered form, as shown, and having a central recess K⁴. Each of the slots K³ registers in turn with the blank-holding table E³, and while in this position the feeding-finger E' moves forward, thrusting a blank U off of the table E³ through the slot K³ and over the matrix I, (see Figs. 1 and 5,) the blank being preferably alined by the guides I' on each side of the matrix, and the feed-finger, which

passes through the opening K⁴, is of course withdrawn before the matrix is moved.

The device which I have shown in the drawings for moving the mandrels to and from the matrices consists of a spring-finger N, (see Figs. 1, 2, 10, 11, and 12,) said finger being secured to a projection A' of the frame and extending over the rollers J³, journaled on the projecting ends J' of the mandrels. It will be readily seen that as the matrix-holder revolves it necessarily carries with it the slides K and the mandrels secured to those slides. Moving from the position at which it receives the blank as above described, in which position the mandrel is far enough from the matrix to give clearance to the blank and blank-feeding mechanism, the roller on the end of this mandrel in this upward position comes in contact with the spring N, and as the mandrel is carried forward by the holder the pressure of the spring, acting upon the holder, gradually forces the mandrel in until it is firmly seated in the matrix, the forcing in of the mandrel being of course accompanied by the downward motion of its slide and a corresponding outward movement of the lowermost mandrel. This action of pushing the mandrel performs the action of bending the blank into a U form around it, as already described, and brings the mandrel and matrix at the end of the quarter-turn of the shaft to the position in which the other operations to complete the blank are performed upon it. The blank having been brought to the U form, (shown in Fig. 24,) the outwardly-extending edges U' are next brought together by folders, which in the case illustrated in the drawings are made up of a pair of jaws Q and q, whose length is substantially that of the mandrels J. These jaws are arranged so as to be close to and parallel with the outer face of the mandrel, on which outer face I will here state that I prefer to form a line of serrations or teeth, as indicated at j. The jaws when closed hold or loosely clamp the paper over the mandrel with yielding pressure, the jaws having springs which tend to bring them together when the cams acting on the jaws permit.

In order to prevent the extreme edges of the paper from lapping over each other down upon the mandrel, I employ a finger (indicated at R) which is brought into alinement along the face of the mandrel where the edges of the blank are to be formed into the seam before the sliding jaws are closed on the paper, that the edges will be intercepted by it and prevented from lapping over each other, as shown in Fig. 25. Having performed this function, the finger has no other duty, and is most conveniently retracted from operative position as soon as possible. The folding-jaws, however, after having closed to form the edges of the blank into the preliminary seam of the tube, as above described, are next moved along over the length of the seam and

parallel with the face of the mandrel, so as to gradually leave the seam outstanding behind the jaws, beginning with one end of the tube and ending with its opposite end. As the outwardly or projecting seam formed of the abutting edges issues or is presented from between the moving jaws it is engaged by a seaming device which folds it over upon itself and down upon the mandrel. This device, as shown, consists of a conical hole formed in the end of a plate S, secured, preferably, to one of the clamping-jaws. The conical hole S' has a slit S², through which the paper passes, and as the seam is drawn through from the larger to the smaller end, or rather as the seamer is drawn over the abutted seam, it is folded down, as shown in Figs. 29, 30, 31, and 32.

It will be noticed that the seamer moves with the jaws as they recede from the blank, and thus gradually folds the seam down, beginning at one end and continuing along until the entire tube is properly seamed. Preferably moving with the jaws and the seamer, I provide a crimping-wheel, which runs over the seam as it is formed and issues from the smaller end of the seamer, and coacting with the serrations *j* on the face of the mandrel forms a line of fine crimps along the folded seam, which securely holds it in place.

The mechanism which I prefer to use for performing the functions above noted is that shown in the drawings, and is carried by a slide P, working in a slide-guide P', which slide-guide is adjustable on the face of the frame, so that the mechanism can be properly adjusted and alined. The adjustment is accomplished, as shown in the drawings, by means of screws P² and P³. (See Figs. 1 and 3.) The screws P², passing through a tap-hole in a ridge A² of the frame and resting against the guides P', serve to thrust it forward, while the screws P³ pass through unthreaded holes in the ridge A² and into tap-holes in the slide-guide and serve to pull it back.

As already stated, my device is especially intended for the manufacture of conical cigarette-tubes, and it will be noted that the mandrels have a conical or tapered form. The jaws and other mechanism for forming the seam on the blank must travel parallel with the face of the mandrel, and they must, in a machine constructed as shown in the drawings, move at an angle to the shaft G' and main driving-shaft, which is parallel to it. A broad spur-wheel O² is secured on stands O³, extending upward from the stationary slide-guide on a shaft O', which lies parallel with the face of the mandrel when the mandrel is in position for the completion of the seam. The shaft O' is also provided with a sprocket-wheel O, which is driven by a sprocket-wheel B⁶ on the driving-shaft B by a sprocket-chain B⁷. (See Figs. 1 and 2.) The slide P moves in a line parallel with the face of the broad gear-wheel O² and carries in stands O⁶ O⁷ a shaft O⁵, which shaft has

secured to it a gear-wheel O⁴, which is engaged with the wheel O² and remains engaged with it during the whole backward and forward movement of the slide; also secured upon the shaft O⁵ are cams Q⁵ Q⁶. (See Figs. 1, 3, and 4.) Between the shaft O⁵ and the face of the matrix-holder H is a shaft Q', supported also by the stands O⁶ O⁷, the function of this shaft being to support the folding or clamping jaws. The lower jaw (indicated by the letter *q*) is in the construction shown secured so as to turn with the shaft, and is situated upon the end of a bell-crank lever *q*², having at its end a cam-roller *q*³, which lies in the path of the cam Q⁵, the cam-roll being kept in contact with the cam by the action of a spring Q⁸ (see Figs. 1 and 3) acting on the shaft Q'. The other jaw (indicated by the letter Q) is secured to a lever-arm Q², which is pivoted on the shaft Q' and provided with a cam-roll Q³, which is held in contact with the cam Q⁶ by the action of a spring, such as is indicated at Q⁹, Fig. 4, which at its top can be attached to a continuation of the upwardly-extending part of the support O⁶. As shown, the lever Q² is provided with an extension which lies under an adjustable stop Q⁷, as shown, consisting of a screw secured on an arm of the bracket or support O⁶. By this device the extreme downward motion of the jaw Q can be regulated independent of the cam, that is to say, it can be arrested at the desired point notwithstanding the fact that the cam is so shaped as to permit it to move still farther down were it not for the stop-screw. I provide this adjustable stop and make the spring acting on this jaw stronger than the spring acting on the other jaw, so as to readily adjust the line of the seam and bring the abutting edges to proper position for the seamer and crimper. Preferably the metal plate S, in which the seaming-cavity S' is formed, is, as shown in the drawings, bolted to an extension of the jaw Q.

Lying in between the jaws Q *q* is the finger R, pivotally supported at R' on a cross-bar O⁹, extending out from the slide and provided with a spring R⁶, which acts only to draw the finger back. At the extreme back of finger R is a cam portion R³. The function of this cam portion is to press the finger forward or inward toward the mandrel before the jaws bring the edges of the blank together and to keep it in that position while the jaws are so acting upon the paper. This it does by the cam portion coming in contact with an adjustable stop or screw R⁵, which is secured on an outwardly-extending pin R⁴, which in turn is secured to the slide-guide and does not move. It will be seen that as the slide P moves to the right to come into the position shown in Fig. 1 the cam portion R³ will move against the stop R⁵ and press the finger in, in which position it will be held by the contact of the stop R⁵ with the straight part R² until the backward motion of the slide brings

the recess portion of R^3 to register with the stop, when the spring will immediately act to move the finger out from the mandrel.

The required reciprocating motion is given to the slide P and the parts connected with it through a connecting-rod P^7 , pivoted at one of its ends on a stud P^6 (see Fig. 4) and at its opposite end to a pin P^8 , secured to an arm on the shaft C' . As shown, it is secured to the cam-plate C^3 , the function of which will be hereinafter described.

T is a crimping-wheel which acts upon the seam immediately after it issues from the seamer, the crimping-wheel coacting with the serrated face j on each mandrel in crimping the blank. The crimping-wheel is secured, as shown, to a link T^9 , pivotally secured to a cross-bar T^{11} , secured in turn to the slide, this connection insuring the proper backward and forward motion of the crimper, and the crimping-wheel is also held on the end of a rod T^2 , with which it is connected by means of a head T^1 , bent, as shown in Fig. 1, in order to clear the clamping-jaws. The rod T^2 , carrying the crimping-wheel on its inner end, passes loosely through a guide-sleeve T^3 , having an enlarged part on its outward end, between which part and the nut t^3 on the rod T^2 is a spring T^4 , which acts to thrust the rod T^2 and crimping-wheel inward, while the nut t^2 at its outward end serves as a stop to regulate the extreme position to which it can move with reference to the guide-sleeve. The guide-sleeve T^3 in turn is supported by trunnions t^5 at the extremity of an arm T^5 of a lever $T^5 T^7$, pivoted at T^6 and having at the end of its arm T^7 a cam-roller in contact with a cam C^3 , secured to and turning with the shaft C' , the spring T^{10} holding the cam-roller in contact with the cam. The action of the cam is such that it first presses the guide-sleeve T^3 toward the mandrel through its means and that of the spring T^4 . The crimping-wheel is pressed against the seam of the paper tube with the required force to crimp it while the slide P is moving to the left, and at the end of this movement the cam withdraws the crimping-wheel from contact with the paper, so that as the slide moves backward the crimping-wheel is kept out of operation.

All of the operations for forming the seam take place while the matrix-holder is stationary and in the position indicated in Fig. 2. It will also be seen that while the seaming of the tube is taking place at the point where the jaws operate the operation of feeding the blank beneath the uppermost mandrel is also taking place, and obviously as the shaft G' makes another quarter-turn the seamed and crimped blank is carried down to the lowermost position, and with the next quarter-turn the mandrel carrying the formed cigarette-wrapper is thrust out from the matrix, so that the conical tube can be withdrawn from it in the position it occupies before the next movement, when it registers with the feed-tables.

It will be noticed that the finger R , the clamping-jaws, and the crimper are always retarded while the matrices and mandrels are in motion, so that they are not brought in contact with the blank until the mandrel carrying it comes to the position of rest in which the seam is formed.

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

1. In a machine for making cigarette-tubes from paper blanks of the desired size and shape, the combination of the following mechanisms: forming mechanism arranged and operating to bring the blank to a substantially U shape throughout its length while the blank is stationary; folding mechanism arranged and operating to bring the opposite edges of the U -shaped blank into abutting contact with each other from end to end of the blank and form a preliminary seam of the tube; seaming mechanism arranged and operating to gradually or progressively turn or fold the preliminary seam over upon itself, beginning at one of its ends and ending at the other; and crimping mechanism arranged and operating to unite together the several thicknesses or plies of paper which compose the turned-over seam.

2. In a cigarette-tube machine the combination of a support, mechanism adapted to grip a paper blank against said support whereby longitudinal movement of the blank is prevented, mechanism arranged to form said blank into a tube around said support, and a crimper arranged to act in conjunction with the support upon the seam of the tube.

3. In a cigarette-tube machine the combination of a support having a serrated face, mechanism adapted to form a blank around said support into a tube, mechanism operating in connection with the support for preventing longitudinal movement of the blank, and a crimper arranged to act on the folded edges of the blank and against the serrated face of the support.

4. In a cigarette-tube machine the combination of a tapered support, mechanism for folding a blank around said support to form a tube with folded edges, and an external crimper arranged to act on the folded seam and against said support.

5. In a cigarette-tube machine, the combination of a support of conical form, mechanism for folding a blank around said support to form a tube with folded edges constituting a seam, and a crimper arranged to act on the folded seam along the face of the support.

6. In a cigarette-tube machine, the combination of a support, means for turning the support laterally, mechanism for forming a blank around said support into a tube with folded edges forming a seam, and a crimper arranged to act on the folded seam and against the said support.

7. In a cigarette-tube machine, the combination with a matrix, of guides $I' I'$ arranged

in plane with and to aline a cigarette-blank over it, and a mandrel arranged to coact with the matrix to form the blank into a U form.

8. In a cigarette-tube machine, the combination of a matrix, a mandrel arranged in alinement with the matrix, a mechanism for operating the mandrel to enter the matrix, means for folding a blank around the mandrel to form a tube, and a crimper adapted to crimp the seam of the tube and arranged to operate on the opposite side of the mandrel to the matrix.

9. In a cigarette-tube machine, the combination of a mandrel, mechanism for forming a paper blank into a tube around said mandrel and bringing the edges thereof into abutting contact without moving said blank longitudinally thereon, mechanism arranged to fold down the abutting edges of the blank to form a seam, and a crimper arranged to crimp said seam against the mandrel as a support.

10. In a cigarette-tube machine, the combination of a mandrel, a matrix, means to cause them to engage each other whereby a blank is formed into U shape, mechanism arranged to bring the edges of the blank together on the side of the mandrel opposite to the matrix, and mechanism reciprocating along the mandrel for folding down the abutting edges of the blank upon the mandrel to form a seam.

11. In a cigarette-tube machine, the combination of a series of mandrels, a series of matrices and mechanism for intermittently rotating them together, the mandrels being arranged and operating to coact with the matrices when in one position to form a blank into U form and in another position to support the U-shaped blank while its opposite edges are formed into a seam and crimped, and seam forming and crimping mechanism, whereby as one blank is being formed into U shape another blank is being seamed and crimped.

12. In a cigarette-tube machine, the combination of a mandrel, mechanism for forming a blank into a tube around said mandrel and leaving abutting edges, such mechanism comprising a pair of clamping-jaws arranged to grasp the abutted edges of the blank with yielding pressure, mechanism for drawing said jaws along the mandrel so as to gradually release their hold upon the abutted edges, and seam-forming mechanism arranged to follow the jaws and form a seam of the abutted edges as they issue from the jaws.

13. In a cigarette-tube machine, the combination of a matrix, a mandrel having a relative motion to and from the matrix whereby the blank is folded around one side of the mandrel, mechanism to bring the edges of the blank together on the other side of the mandrel, mechanism for folding down the abutting edges of the blank upon the mandrel to form a seam, and a crimper arranged to act on said seam against the mandrel.

14. In a cigarette-tube machine, the combination of a mandrel, mechanism for forming

a blank around said mandrel into tubular form and leaving abutting edges without moving it longitudinally thereon, a device arranged along the outer face of the mandrel to prevent the edges of the blank from folding over each other or onto the mandrel, and a folding device acting on the abutting edges to form a seam against the mandrel.

15. In a cigarette-tube machine, the combination of a mandrel, mechanism for folding a blank around the same, said folding mechanism consisting in part of tube-closers arranged to bring the edges of the blank together on the outside of the mandrel, and mechanism arranged to move the tube-closers along the mandrel while acting on the blank.

16. In a cigarette-tube machine, the combination of a mandrel, mechanism for folding a blank around the same, said folding mechanism consisting in part of tube-closers arranged to bring the edges of the blank together on the outside of the mandrel, mechanism arranged to move the tube-closers along the mandrel while acting on the blank, and a seam-folder arranged to move with the tube-closers, and to fold the abutted edges of the blank down to form a seam as it issues from between the moving tube-closers.

17. In a cigarette-tube machine, the combination of a mandrel, mechanism for folding a blank around the same, said folding mechanism consisting in part of tube-closers arranged to bring the edges of the blank together on the mandrel, mechanism arranged to move the tube-closers along the mandrel while acting on the blank, a seam-folder arranged to move with the tube-closers to fold the abutted edges of the blank down to form a seam as it issues from between the moving tube-closers, and a crimper arranged to act on the folded seam against the mandrel.

18. In a cigarette-tube machine, the combination of a mandrel, mechanism for folding a blank around the same, said folding mechanism consisting in part of tube-closers arranged to bring the edges of the blank together on the mandrel, a slide carrying the tube-closers and arranged to move parallel with the face of the mandrel, mechanism arranged to move the slide along the face of the mandrel, a folder arranged to move with the tube-closers and to fold the abutted edges of the blank down to form a seam as it issues from between the moving tube-closers.

19. In a cigarette-tube machine, the combination with an unyielding concave matrix and a mandrel arranged to cooperate therewith, of a yielding gripping device passing through the stationary bottom of the matrix and in its normal position extending to the plane of the top or outer edges of the matrix, and mechanism for moving the mandrel relatively to the matrix whereby the blank is held in proper position against the mandrel while it is being carried into the matrix and pressed between the wall of the matrix and the mandrel.

20. In a cigarette-tube machine; the combination with an intermittently-rotating matrix-holder H having two or more matrices and blank-guides I' I' arranged at different points on its periphery, of mandrels corresponding in number to the matrices and arranged to rotate therewith and to coact with the matrices in folding the blanks around the said mandrels.

21. In a cigarette-tube machine, the combination with an intermittently-rotating matrix-holder H having matrices and blank-guides I' I' in its periphery, of mandrels corresponding in number to the matrices and arranged to rotate therewith, and means to move the mandrels alternately away from the matrices to permit the insertion of the blanks and the withdrawal of the tubes and toward them to coact during the formation of the tubes.

22. In a cigarette-tube machine, the combination with an intermittently-rotating matrix-holder H having a matrix arranged on its periphery, of a corresponding mandrel, a slide to which the mandrel is secured arranged to rotate with the holder but free to move across its axis, and mechanism arranged to act on the mandrel and press it against the matrix as the holder revolves.

23. In a cigarette-tube machine, the combination of a blank-holding table, an intermittently-acting feeder arranged to feed the blanks forward from said table, an intermittently-rotating matrix-holder H, having a series of matrices secured to its periphery and arranged to register in turn with the blank-holding table, a series of mandrels secured to the holder so as to rotate with it while free to move to and from the matrices, and mandrel-actuating mechanism arranged to raise the mandrels above the matrices and hold them so raised while the matrices register with the table and to force them down into the matrices as each matrix moves away with a blank.

24. In a cigarette-tube machine, the combination with a series of intermittently-rotating mandrels and mechanism arranged to form a blank into a U form around the same, of a slide arranged to move in line with the face of each mandrel when in one position of rest, clamping-jaws secured to said slide and arranged to act on the edges of the blank and form a tube around the mandrel, a seamer arranged to act on the abutted edges of the blank and form a seam and to move with the slide, and slide-actuating mechanism arranged to move the closed jaws and the seamer forward along the side of the mandrel to form a seam as specified and then to move them back to position to act on another blank.

25. In a cigarette-tube machine, the combination with a series of intermittently-rotating mandrels and mechanism for forming a blank into a U form around the same, of a slide arranged to move in line with the face of each mandrel when in one position of rest,

clamping-jaws secured to said slide and arranged to act on the edges of the blank and form the tube around the mandrel, a folder arranged to act on the abutted edges of the blank and form a seam and to move with the slide, slide-actuating mechanism arranged to alternately move the closed jaws and the seam-folder forward along the side of the mandrel as specified and then move them back to position to act on another blank, and a crimper also actuated by the slide aforesaid and arranged to follow the seam-folder and crimp the seam against the mandrel.

26. In a cigarette-tube machine, the combination with a mandrel and mechanism for folding a blank around the same to form a tube, of an alining-finger, and mechanism arranged to bring the finger and mandrel into such relative position while the blank is being folded around the mandrel as to prevent its edges from lapping over each other and onto the mandrel and subsequently to so change the relative position of the finger and mandrel that the edges of the blank are free to abut.

27. In a cigarette-tube machine the combination of a mandrel, mechanism for folding a blank around said mandrel to form a tube, an alining-finger arranged along the side of the mandrel to prevent the extreme edges of the paper from folding over each other or onto the mandrel, mechanism for drawing said finger along the mandrel and means for removing the finger from between the edges of the paper as described.

28. In a cigarette-tube machine, the combination of a mandrel, mechanism for folding a blank around said mandrel to form a tube, an alining-finger arranged along the side of the mandrel to prevent the extreme edges of the paper from folding over each other and mechanism for drawing said finger outward from the mandrel to permit the edges of the blank to abut.

29. In a cigarette-tube machine, the combination of the mandrel with the jaws arranged to clamp the paper around the same, the alining-finger arranged between the jaws and acting to prevent the paper from folding down onto the mandrel, the seam-folder arranged to act on the abutted edges of the blank to form a seam, and the crimper moving with the jaws and seam-folder to crimp the formed seam against the mandrel.

30. In a cigarette-tube machine the combination with the mandrel, the mechanism for forming a blank into a tube around the same, the sliding clamping-jaws and a seamer, of a crimping-wheel, mechanism for moving it forward and backward along the mandrel, and mechanism arranged to press said crimping-wheel against the mandrel with resilient pressure as it moves along the seam to crimp it and to draw said wheel away from the mandrel as it returns.

31. In a cigarette-tube machine, the combination with the slide P having clamping-jaws

and the seamer secured thereto, of a guide P' for said slide, means for adjusting said guide, and a mandrel adapted to coact with said jaws.

5 32. In a cigarette-tube machine, the combination of a jaw, as *g*, a pivoted jaw Q adapted to cooperate therewith, an adjustable stop Q' and a seamer S' secured to the end of the jaw Q.

10 33. In a cigarette-tube machine, the combination with the holder H having a number of

matrices therein, of means for giving said holder an intermittent rotating motion, sliding mandrel-holders K K arranged in guides in said holder, a spring M arranged to yield- 15
ingly secure the holders K K to the holder H, and mandrels secured in said holders K K above the matrices.

JAMES A. BONSAACK.

Witnesses:

LEWIS R. DICK,
J. H. RUSSELL.