(No Model.) 5 Sheets—Sheet 1.

J. O. EATON.

CIGARETTE MACHINE.

No. 602,436. Patented Apr. 19, 1898.

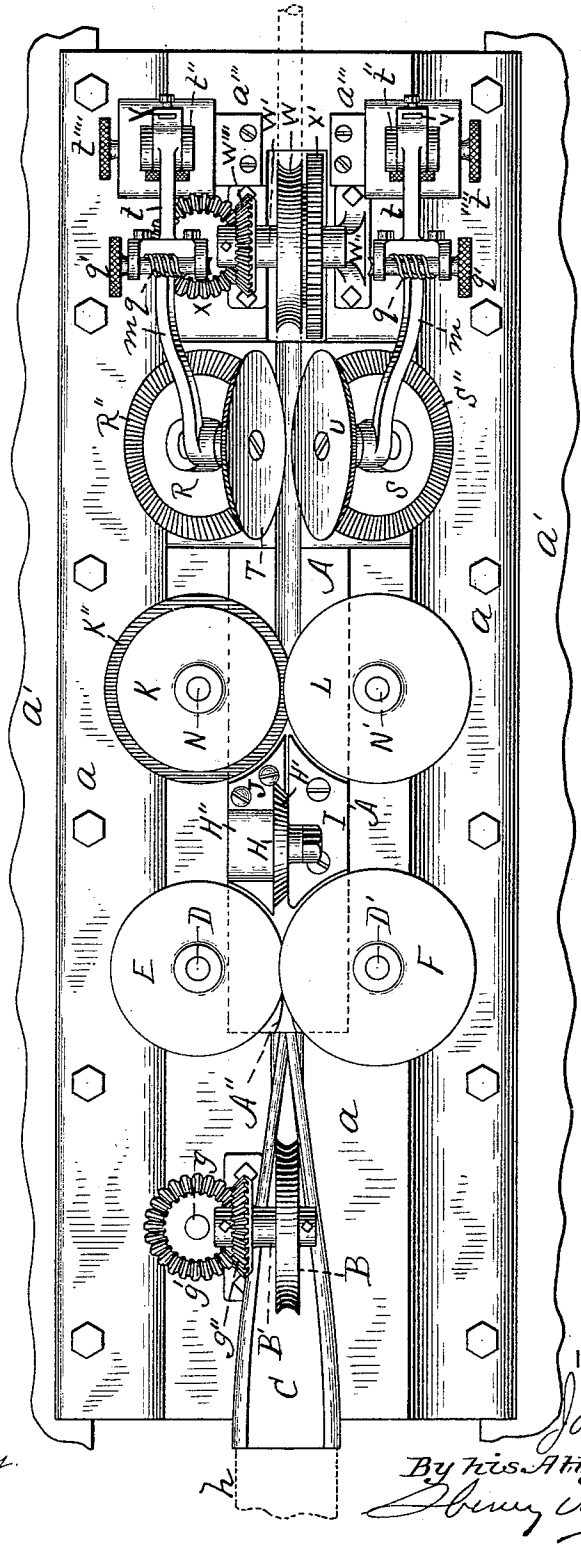


Fig. 1.

WITNESSES:
A. A. Pomeroy
A. G. Pomeroy

INVENTOR:
John O. Eaton
By his Atty
Henry W. Williams

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

(No Model.)

5 Sheets—Sheet 2.

J. O. EATON.

CIGARETTE MACHINE.

No. 602,436. Patented Apr. 19, 1898.

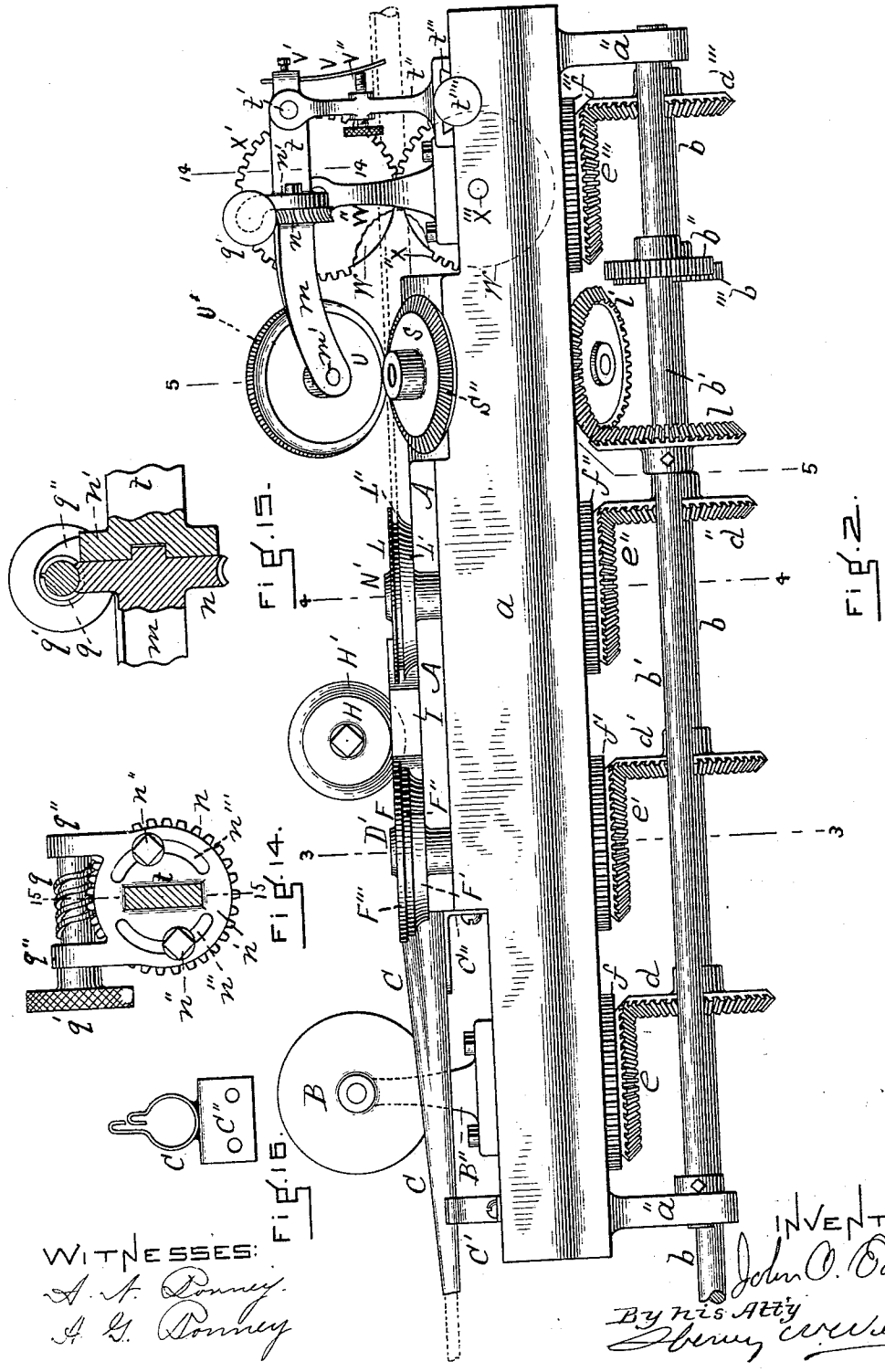


Fig. 2.

Fig. 15.

Fig. 14.

Fig. 16.

WITNESSES:
A. T. Bonney.
A. G. Bonney

INVENTOR:
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(No Model.) 5 Sheets—Sheet 3.

J. O. EATON.

CIGARETTE MACHINE.

No. 602,436. Patented Apr. 19, 1898.

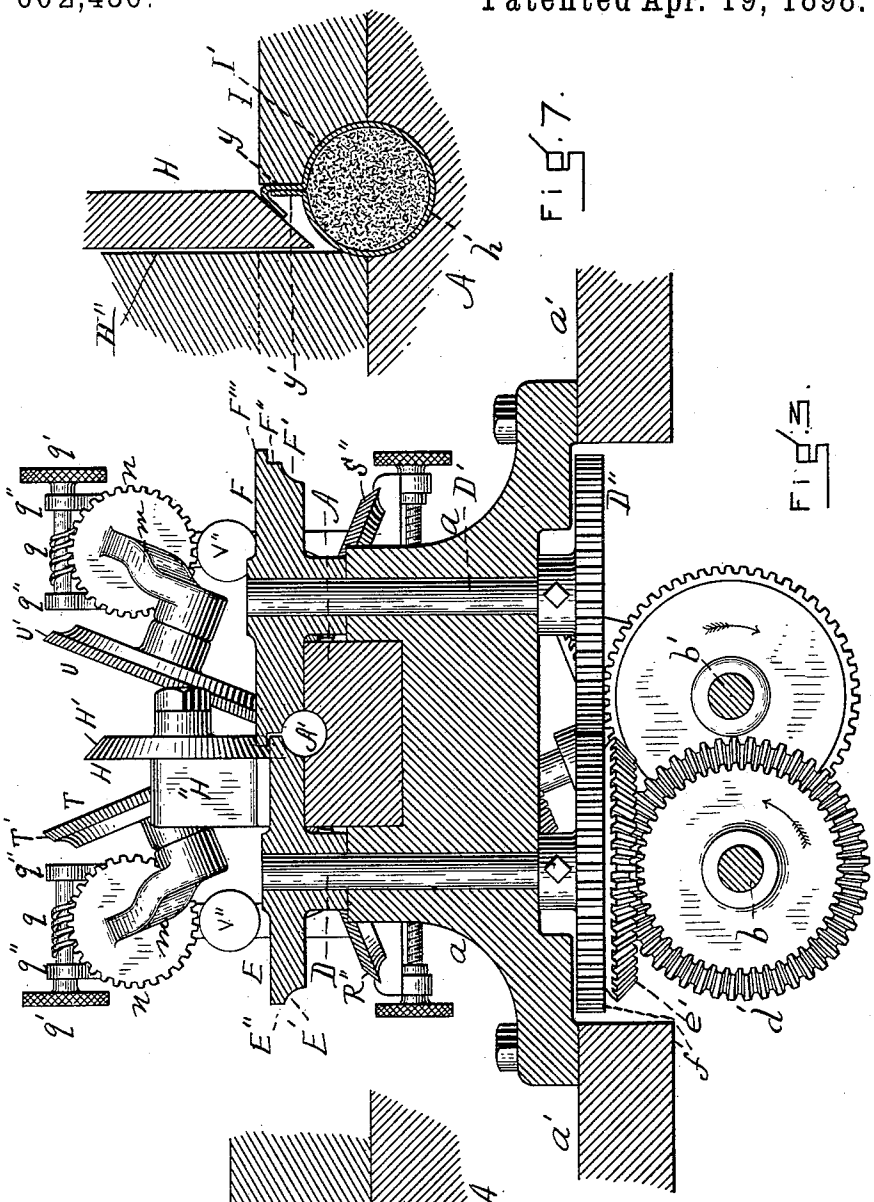


Fig. 7.

Fig. 8.

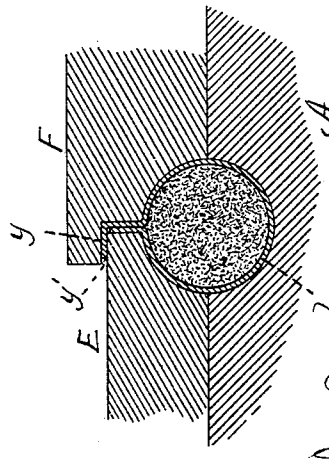


Fig. 6.

WITNESSES:
A. A. Downey.
A. G. Downey.

INVENTOR:
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Henry C. Williams

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(No Model.) 5 Sheets—Sheet 4.

J. O. EATON.

CIGARETTE MACHINE.

No. 602,436. Patented Apr. 19, 1898.

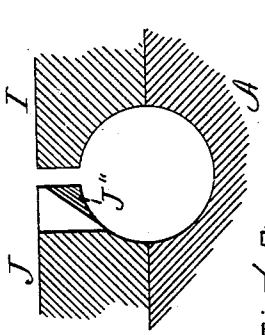


Fig. 8.

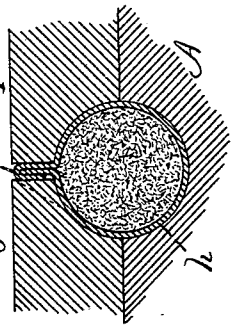


Fig. 9.

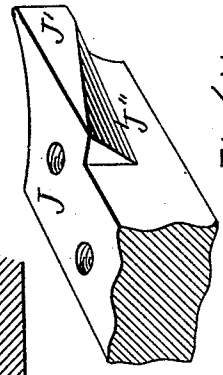


Fig. 11.

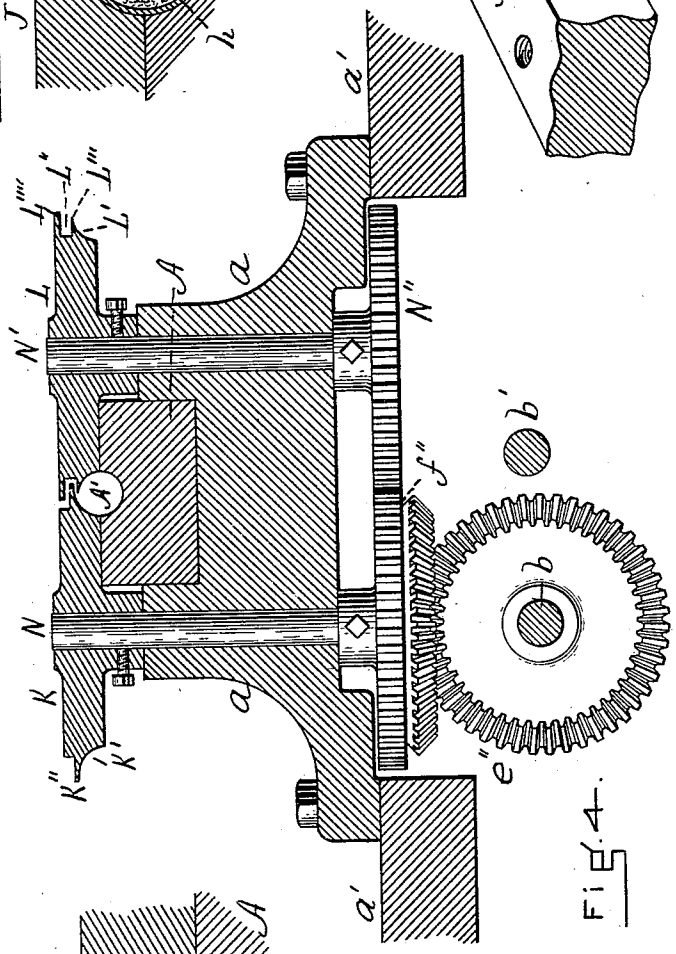


Fig. 4.

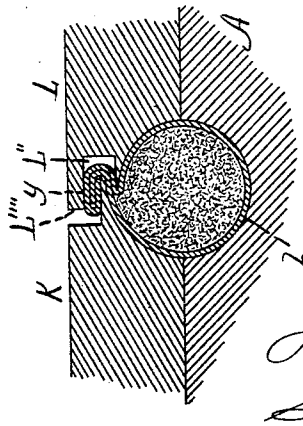


Fig. 10.

WITNESSES:

A. F. Ponney.

A. G. Ponney.

INVENTOR:

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Henry W. Williams

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(No Model.) 5 Sheets—Sheet 5.

J. O. EATON.

CIGARETTE MACHINE.

No. 602,436. Patented Apr. 19, 1898.

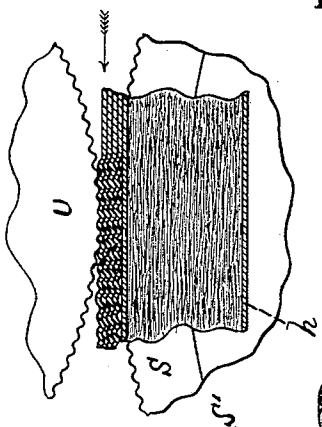


Fig. 11.

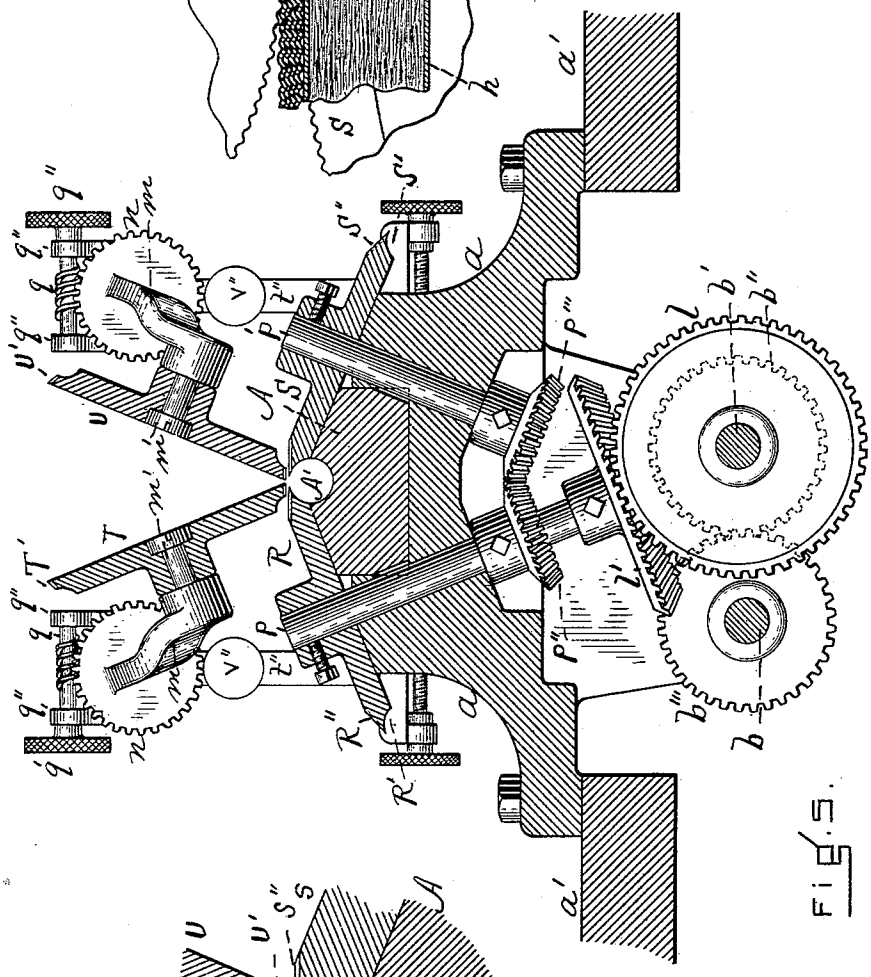


Fig. 5.

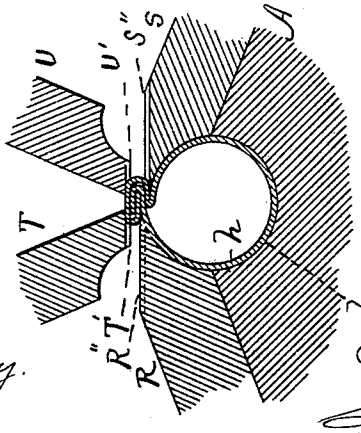


Fig. 12.

WITNESSES:
A. F. Bonney.
A. G. Bonney.

INVENTOR:
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By his Att'y
Henry Williams

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UNITED STATES PATENT OFFICE.

JOHN O. EATON, OF FALL RIVER, MASSACHUSETTS, ASSIGNOR OF ONE-FOURTH TO JOHN MARSHALL, OF SAME PLACE.

CIGARETTE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 602,436, dated April 19, 1898.

Application filed June 8, 1897. Serial No. 639,821. (No model.)

To all whom it may concern:

Be it known that I, JOHN O. EATON, a citizen of the United States, residing in Fall River, in the county of Bristol, in the State of Massachusetts, have invented new and useful Improvements in Cigarette-Machines, of which the following is a specification.

This invention relates to cigarette-machines of that class in which continuous cigarettes are made by applying a long or continuous wrapper-strip to a continuous filler, commonly termed a "tobacco rod," and folding the opposite edges of the wrapper into engagement with each other and uniting them by crimping, so as to form a complete seam without the use of paste or other adhesive substance.

A cigarette made by this machine forms the subject of an application by me for Letters Patent, filed June 8, 1897, Serial No. 639,822.

In this invention the wrapper-seam of the cigarette is folded and crimped from the outside—that is to say, all the mechanism which folds and crimps the seam is applied on the outside of the wrapper, and no mechanism or tool whatever is applied within or to the inside of the wrapper or tube containing the filler.

In the employment of ordinary continuous-cigarette machines in which the cigarette is crimped from both sides—that is, by applying mechanism to the outside of the seam and within the wrapper—the filler often becomes clogged by the inside crimper and mandrel and the paper constituting the seam is very liable to become cut. These and other objectionable features are done away with by my improved machine, in which a welt-seam is produced providing an excellent lock, whereby the wrapper is united at its edges very securely without the aid of paste, the crimpers being enabled to be made larger and give greater pressure on account of their external position.

The nature of the invention is fully described in detail below and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my new and improved cigarette-machine. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse vertical section taken on line 3, Fig. 2. Fig. 4 is a similar section taken on line 4, Fig. 2. Fig. 5 is a similar section taken on line 5, Fig. 2. Figs. 6, 7, 8, 9, and 10 are enlarged transverse sections in detail, illustrating successive steps in the process of making the seam. In all these figures except Fig. 8 the tobacco rod and wrapper are shown in section and in position. Fig. 11 is an enlarged detail in perspective, illustrating the portion of the shaper shown in section in Fig. 9. Fig. 12 is an enlarged cross-section in detail, illustrating the process of crimping the seam. Fig. 13 is an enlarged section in detail, taken longitudinally through a portion of the tobacco rod and wrapper, illustrating the crimping process. Fig. 14 is an enlarged sectional elevation in detail, taken on line 14, Fig. 2. Fig. 15 is a sectional detail taken on line 15, Fig. 14. Fig. 16 is an elevation of the inner end of the shaper C.

Similar letters of reference indicate corresponding parts.

A represents a horizontal bed, preferably of metal, supported in and by a suitable base *a*, which sits upon a table *a'*. Formed in the upper surface of this bed A is a horizontal groove A', semicircular in shape and one-half the thickness and circumference of the cigarette which is to be formed therein. This groove extends from one end to the other of the bed and is flared at its entrance, as shown at A'', Fig. 1.

b is the driving-shaft, supported horizontally in the brackets or hangers *a''*, Fig. 2, and *b'* is a counter-shaft, fast upon which is the gear *b''*, engaged by the gear *b'''* on the main shaft *b*, Figs. 2 and 5. Fast on the driving-shaft *b* are the four bevel-gears *d d' d'' d'''*, which engage, respectively, the bevel-teeth *e e' e'' e'''*, integral with the gear-wheels *f f' f'' f'''*.

The gear-wheel *f* is fast on the vertical shaft *g*, which extends up through the base *a* at the left end of the machine, which is the end at which the wrapper and tobacco rod enter. On the upper end of the shaft *g* is a bevel-gear *g'*, Fig. 1, which engages a bevel-gear *g''* on the horizontal shaft B', supported by a suitable bracket or standard B'', bolted to the surface of the base *a*. This shaft B'

drives a disk-wheel B, whose periphery is concave in cross-section and which is not thicker than the diameter of the groove or trough A', Figs. 1 and 2. A horizontal guide or shaper C, broad at its rear end and narrowing toward its front end, is sustained by the support C', secured to the surface of the base *a*, and the bracket C'', which is secured to and extends rearwardly from the front end of the bed A. This guide-trough or shaper has its upper edge folded inward, as shown, and receives the continuous strip (indicated by broken lines *h* in Figs. 1 and 2) from which the wrapper is to be formed. This strip is guided into the machine to be folded and crimped, as hereinafter described, by the shaper C, and the tobacco rod is guided by the disk-wheel B, which is formed with an annular groove for the purpose of resting on the upper edge of said rod as it is fed into the machine. The shaper C is set at such a height as to guide the strip into the groove or trough A' in the bed, which sits above the surface of the base *a*, as shown in the different figures.

The gear-wheel *f'* is fast on a vertical shaft D, which extends up through the base, and said gear-wheel engages a similar gear-wheel D'', fast on the vertical shaft D', which also extends up through the base. Rigidly secured to the upper ends of these shafts are the disk-wheels E and F. These wheels are set horizontally, so as to lie close upon the bed A, and the under portions of their peripheries are grooved at E' and F', each groove describing an arc of a circle and the two completing the circle, one-half of which is described by the groove or trough A' in the bed. (See Fig. 3.) The portion E'' of the periphery of the wheel E is plain, and the opposite portion F'' of the periphery of the wheel F is also plain; but this latter wheel is thicker than the wheel E, and its periphery is formed with a horizontal annular extension or lip F''', which overlaps the upper surface of the wheel E. When the strip *h* is fed into the machine and reaches the flared end A'', Fig. 1, of the trough, the edge *y* is higher than the other edge *y'*, and as the strip is fed between the wheels E and F the effect of the flange or lip F''' is to fold the edge *y* horizontally over and across the edge *y'* into the position indicated in Fig. 6.

Mounted upon a support H'', just beyond the disk-wheels E F, is a vertically-set wheel H, adapted to rotate freely on said support and having its periphery beveled, as shown at H'. The face of this wheel (which is about one-half the thickness of the tobacco rod) is substantially over the longitudinal center of the trough A', and a guide-plate I is secured to the bed opposite this wheel and in such a position that the groove I' on its inner edge, Fig. 7, continues the curve described by the trough A'. As the strip proceeds from between the wheels E F to the wheel H and guide I the effect is to turn the edge *y* of the wrapper, which in Fig. 6 was horizontal, down to the angle indicated in Fig. 7. Next beyond the disk-wheel H and support H'' is a plate J, secured to the bed, such plate being provided with a guiding-lip J', (see Figs. 8, 9, and 11,) the end of which next the approaching strip is beveled off diagonally at J'', so as to cut off the corner next the approaching strip. As the edge of the lip J' faces the inner edge of the plate I, the effect of this diagonal bevel is to draw or guide the partially-folded edge of the wrapper from the position indicated in Fig. 7 to the position indicated in Fig. 9, or, in other words, to fold said edge *y* entirely around and closely against the narrower edge *y'*.

The plates I and J are curved or pointed forward at their inner ends, so as to guide the strip between the two horizontal wheels K and L, mounted, respectively, on the vertical shafts N and N', the latter being provided with the gear-wheel N'', which is engaged by the gear-wheel *f'''*. The lower portions of the peripheries of these disk-wheels K L are grooved at K' L' to fit the cigarette-rod, and said wheels lie closely upon or over the bed A in the same manner as the wheels E F. Above the groove L' in the wheel L its periphery is provided with an annular notch or substantially rectangular groove L'', and the wheel K is provided with a peripheral annular tongue K'', which extends into the groove L'', all as shown in Fig. 4. As the strip or wrapper is fed from the plates I and J between the wheels K and L the tongue K'' engages the wrapper just below the edge of the flap *y*, while the sharp projection L''', which constitutes the lower wall of the groove L'', extends into the wrapper from the opposite side and doubles it under the part engaged by the tongue K'', the upper wall L'''' of the groove folding the two flaps over upon the tongue K'', all as indicated in Fig. 10. This leaves the uncrimped seam about evenly arranged on the opposite side of the center of the cigarette or on opposite sides of the point at which the wrapper is folded or formed into a seam. The next step is to crimp the seam. A bevel gear-wheel *l*, Figs. 2 and 5, driven by the counter-shaft *b'*, engages the bevel-gear *l'* on the inclined shaft P, extending up at an angle through the base *a*. (See Fig. 5.) A bevel-gear P'' on said shaft engages a bevel-gear P''' on an oppositely-inclined shaft P'. Fixed on the upper ends of said shafts P P' are the inclined disk-wheels R and S, the lower corners of whose peripheries are provided with curved grooves R' and S' to accommodate the tobacco rod and wrapper, while the upper corners are beveled off at R'' S'' to form a horizontal surface, which is suitably serrated for crimping purposes, Figs. 1, 2, and 5. The bed A is beveled off to allow these wheels to meet over the trough A'.

T U are disk-wheels set at opposite inclines and provided with beveled serrated peripheries T' U', adapted to press upon the upper surface of the seam, as illustrated in Figs.

12 and 13, when the wrapper containing the rod of tobacco is forced from the position indicated in Fig. 10 between the pair of wheels R S and the pair of wheels T U. Thus the seam is crimped on the upper and under sides and the entire crimping mechanism is outside the wrapper and applied to the outside of the seam. The wheels T U are supported on studs m', extending from arms m, which are integral with and extend from the faces of the gear-wheels n, being secured to the faces of the disks n' by bolts n'', which extend through curved slots n''' in said disks. (See Figs. 1, 2, 5, 14, and 15.) Arms q'' extend up from the disks n' over worms q, operated by hand-wheels q'. From and integral with the disks n' extend the arms t, which are pivotally supported at t' by uprights t'', extending up from the base a. These uprights are adapted by dovetail grooves t''' and screws t'''' to slide transversely toward and from each other on slides a''', Fig. 1. By means of the dovetail grooves t''' the uprights t'' and hence the wheels T and U may be adjusted laterally, and by means of the worm-gears q n and the adjustable disks n' the relative angles of said wheels T U may be adjusted and changed. In order that the pressure of the crimping-wheels T U upon the lower crimping-wheels R S may be regulated, springs V have their upper ends secured by suitable set-screws V' in the rear ends of the arms t, and horizontal screws V'' in the uprights t'' regulate the tension of said springs and hence the pressure of the upper crimping-wheels upon the lower. After the continuous cigarette has passed from between the pairs of wheels R S and T U it is guided and drawn out of the machine by the grooved disk-wheel W on the stud W', Fig. 1, mounted on the standards W'', Fig. 2. This stud is driven by a bevel-gear W''', which is engaged by the bevel-gear X, fast on the upper end of a vertical shaft whose lower end has fast upon it the gear-wheel f'''. A gear-wheel X' is rigid with the grooved disk-wheel W and engages a gear-wheel X'', Fig. 2, mounted on a stud X'''. Rigid with this gear-wheel X'' and exactly under the grooved wheel W is a similar grooved wheel engaging the under side of the wrapper. Thus the tobacco rod and wrapper are carried through the machine and a welt-seam formed and crimped by the pairs of disk-wheels E and F, K and L, T and U, and R and S, the latter being fully adjustable and conducted out of the machine with the seam completed by the grooved wheel W and a similar one beneath it, all through the medium of the different connections between said wheels and the driving-shaft b.

In practice the crimping-wheels should be so adjusted that the inside edges will mesh deeper than the outside edges in order to full in the extra amount of paper at that edge. The paper is taken into the machine from a suitable reel and the continuous cigarette after leaving the machine passes to the cutting device. Of course all the parts coming in contact with the paper travel at the same rate of speed.

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

1. In a continuous-cigarette machine in which the strip or wrapper-tube is fed into the machine with its edges upturned and one higher than the other, the combination of the following mechanisms: mechanism arranged to turn the broader edge or flap of the wrapper-tube horizontally over and across the upturned narrower edge or flap; mechanism for folding said broader edge or flap down around and against the narrower edge or flap; mechanism for folding the two flaps thus formed down into a seam on opposite sides of the center or opening into the wrapper proper; and crimping mechanism entirely outside of the wrapper-tube arranged to unite the several thicknesses or plies of paper which compose the seam thereby produced.

2. In a continuous-cigarette machine, a bed provided with a trough or groove A' for the reception of the tobacco rod and strip; the horizontally-arranged disk-wheels E and F having the under edges of their peripheries formed with curved grooves continuing and completing the circle of which said trough describes an arc, said disk-wheel F being provided with the peripheral lip F''' arranged to overlap the edge of the disk-wheel E and thereby fold one edge or flap of the wrapper-tube horizontally over and across the opposite edge or flap; and mechanisms for feeding the tobacco rod and strip between said wheels and for rotating the latter, substantially as described.

3. In a continuous-cigarette machine, a bed provided with a trough or groove A' for the reception of the tobacco rod and strip; the horizontally-arranged disk-wheels E and F having the under edges of their peripheries formed with curved grooves continuing and completing the circle of which said trough describes an arc, said disk-wheel F being provided with the peripheral lip F''' arranged to overlap the edge of the disk-wheel E; the vertically-arranged disk-wheel H provided with the beveled periphery H'; the guide-plate I formed with the groove I'; and mechanisms for feeding the tobacco rod and strip between said disk-wheels E, F and between the beveled disk-wheel H and guide I, whereby one edge or flap of the wrapper-tube is folded over the opposite edge or flap and down at an acute angle therewith, substantially as set forth.

4. In a continuous-cigarette machine, a bed provided with a trough or groove A' for the reception of the tobacco rod and strip; mechanism arranged and adapted to operate therewith to turn the strip into tubular form and to fold one edge or flap of the wrapper-tube over the other edge or flap and down at an acute angle therewith; the shaping-block J secured to the bed in advance of said mech-

anism and provided with the inner vertical edge J′ arranged centrally over the tobacco rod, said edge being formed with the beveled surface J″ facing the advancing strip or wrapper; the guide-plate I set opposite the shaping-block J and having an inner vertical edge; and mechanism for feeding the tobacco rod and strip along said trough or groove, whereby one edge or flap of the wrapper-tube is folded over and down against the outer surface of the opposite edge or flap, substantially as described.

5. In a continuous-cigarette machine, a bed provided with a trough or groove A′ for the reception of the tobacco rod and strip; mechanism arranged and adapted to operate therewith to turn the strip into tubular form and to fold one of the edges or flaps of the wrapper-tube over and against the outer surface of the opposite edge or flap; the horizontally-arranged disk-wheels K and L provided with the curved grooves K′ and L′ on the under edge of their peripheries, said wheel K being formed with the peripheral tongue K″, and said wheel L being formed with the peripheral groove L″ the under wall of which extends approximately to a sharp edge L‴, said tongue K″ being adapted to extend into said groove L″; mechanism for feeding the tobacco rod and strip along said trough; and mechanism for imparting rotation to said disk-wheels, whereby the welt-seam above described is produced and formed to extend on opposite sides of the entrance to the body of the wrapper-tube, substantially as set forth.

6. In a continuous-cigarette machine, a bed provided with a trough or groove A′ for the reception and passage of the tobacco rod and strip; mechanism adapted to operate therewith to turn the strip into tubular form and to form a seam which extends on opposite sides of the center or entrance to the body of the wrapper-tube; the oppositely-inclined disk-wheels R, S formed on their under edges with the peripheral grooves R′ S′ and on their upper edges with the beveled crimping-surfaces R″ S″; the oppositely-inclined disk-wheels T, U formed with the peripheral crimping edges T′ U′ and arranged to press upon the upper side of the seam while the crimping edges of the wheels R, S press up against the under side of the seam between said seam and the body of the wrapper; mechanism for imparting rotation to the four said disk-wheels; and mechanism for feeding the tobacco rod and tube with the seam formed thereon along said trough, substantially as described.

7. In a continuous-cigarette machine, the adjustable crimping mechanism, comprising the bed A provided with the trough A′; the oppositely-inclined lower disk-wheels R, S; the oppositely-inclined upper disk-wheels T, U; the gear-wheels n provided with the integral arms m supporting studs upon which the upper disk-wheels revolve; the disks n' adjustably secured to said gear-wheels by means of bolts and curved slots n'''; arms t extending from said disks n' and pivotally supported by standards t'' adapted to be moved laterally on the base of the machine; worms q supported by said disks n' and engaging said gear-wheels n, and adjustable springs adapted to regulate the tension of the upper pair of crimping-disks upon the lower pair, substantially as set forth.

JOHN O. EATON.

Witnesses:
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RICHARD T. GRENFELL.