No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(No Model.) (Application filed Dec. 14, 1898.)

16 Sheets—Sheet 1.

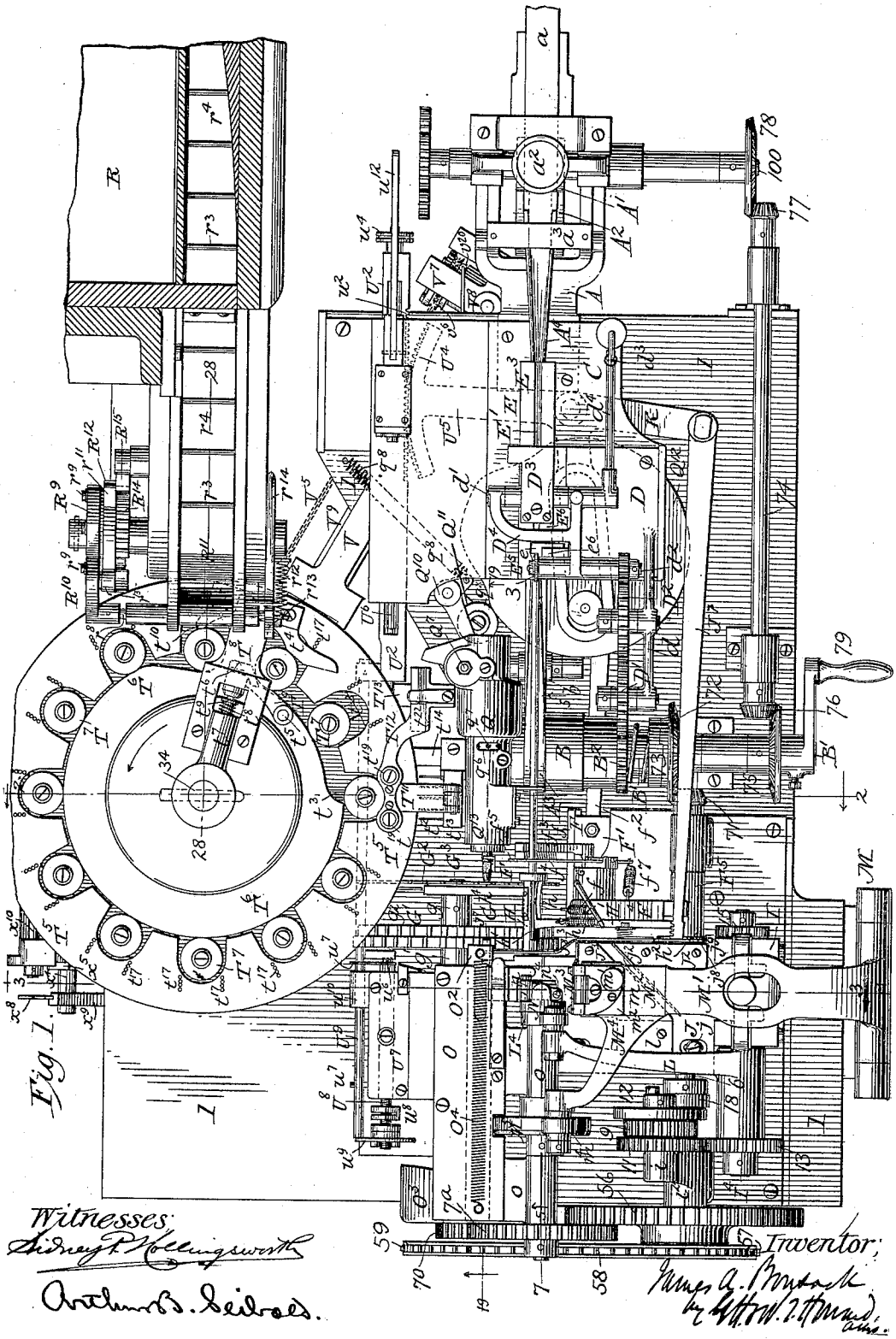


Fig. 1.

Witnesses:
Sidney P. Hollingsworth
Arthur B. Seibold.

Inventor:
James A. Bonsack
by Wm. W. Thomas
Atty.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(No Model.) (Application filed Dec. 14, 1898.)

16 Sheets—Sheet 2.

Fig. 2.

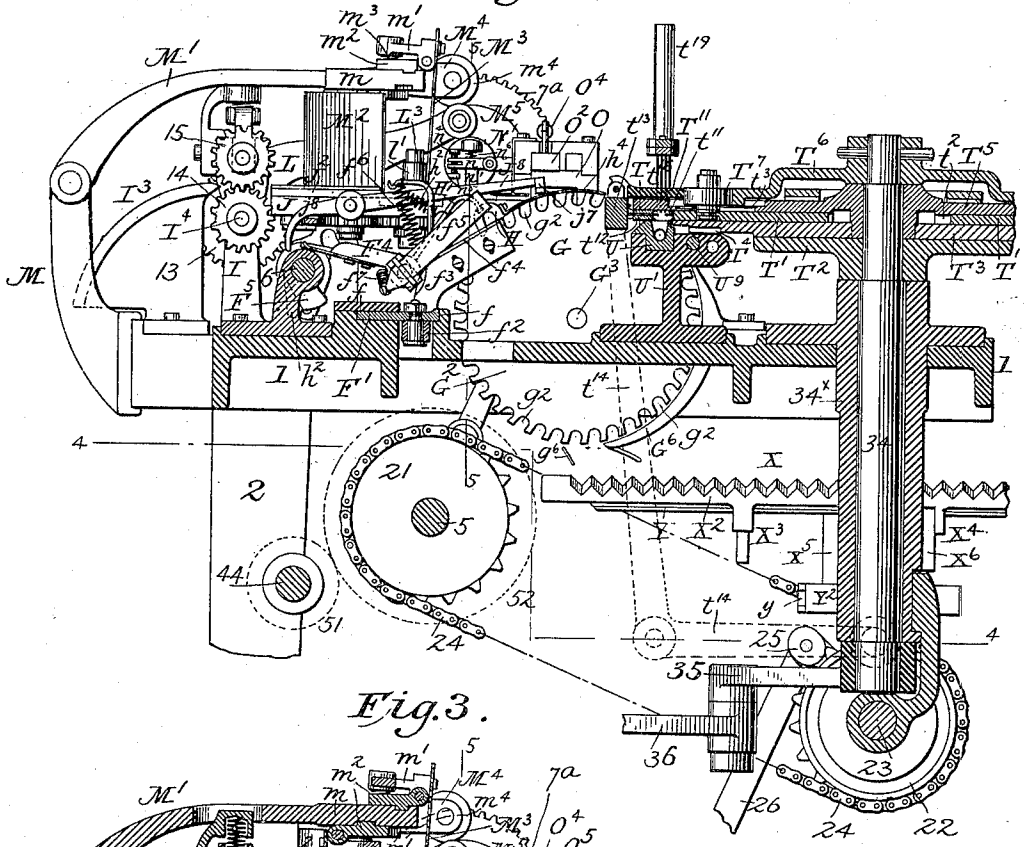
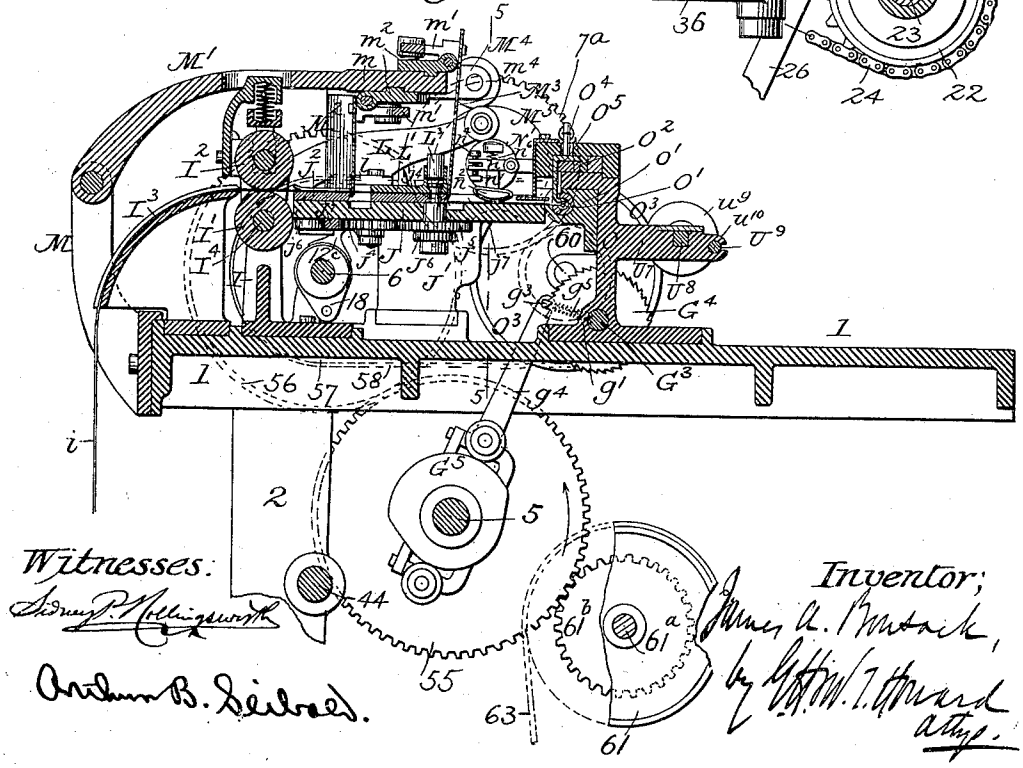


Fig. 3.



Witnesses:

Sidney P. Hollingsworth

Arthur B. Seibold.

Inventor;

James A. Bonsack,

by Geo. W. Howard

Atty.

No. 672,348.

Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(No Model.)

(Application filed Dec. 14, 1898.)

16 Sheets—Sheet 3.

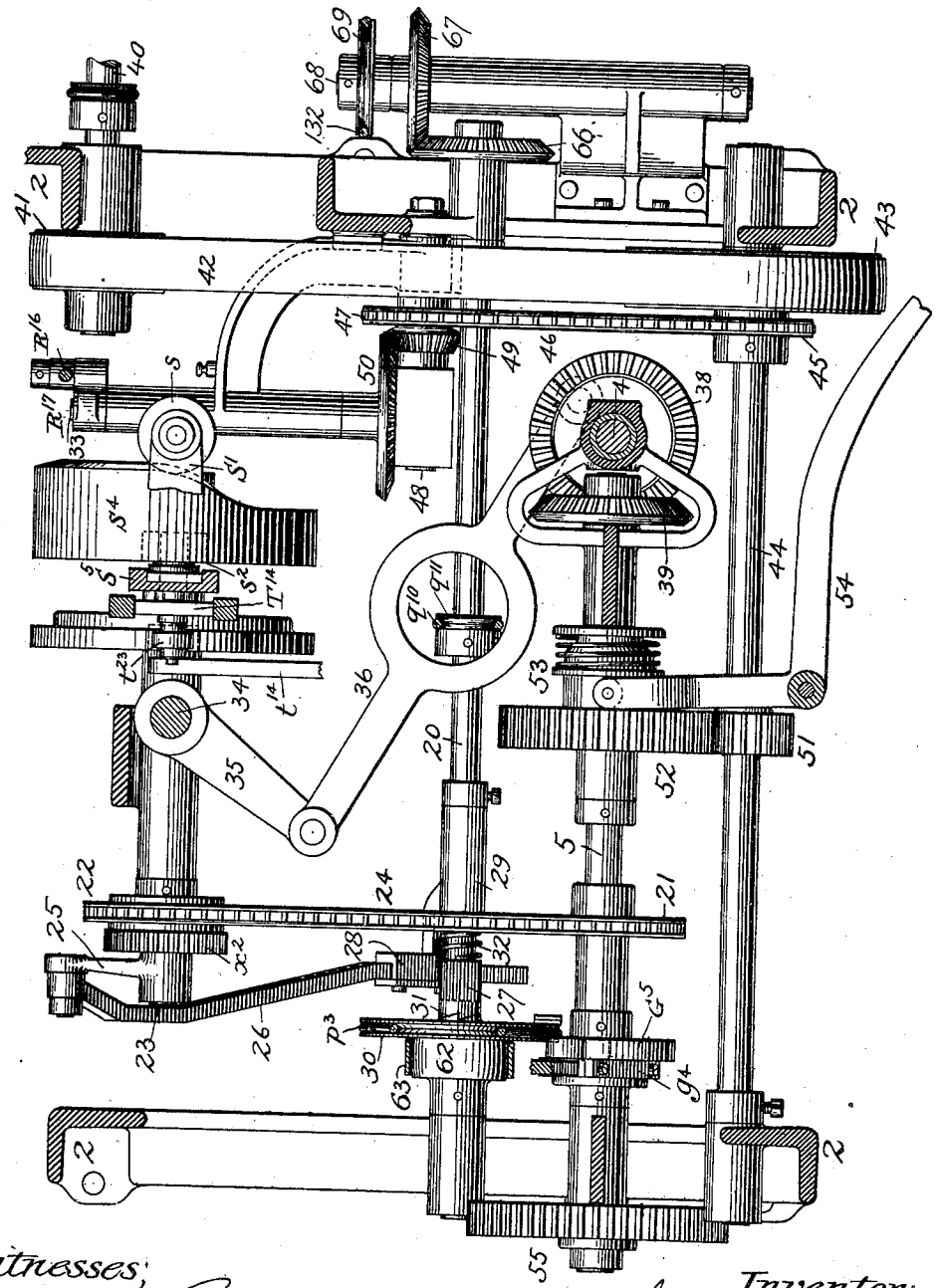


Fig. 4.

Witnesses:
Sidney F. Rollingsworth
Andrew B. Stubbs

Inventor:
James A. Bonsack,
by Wm. T. Howard
Atty

No. 672,348.

Patented Apr. 16, 1901.

J. A. BONSACK.

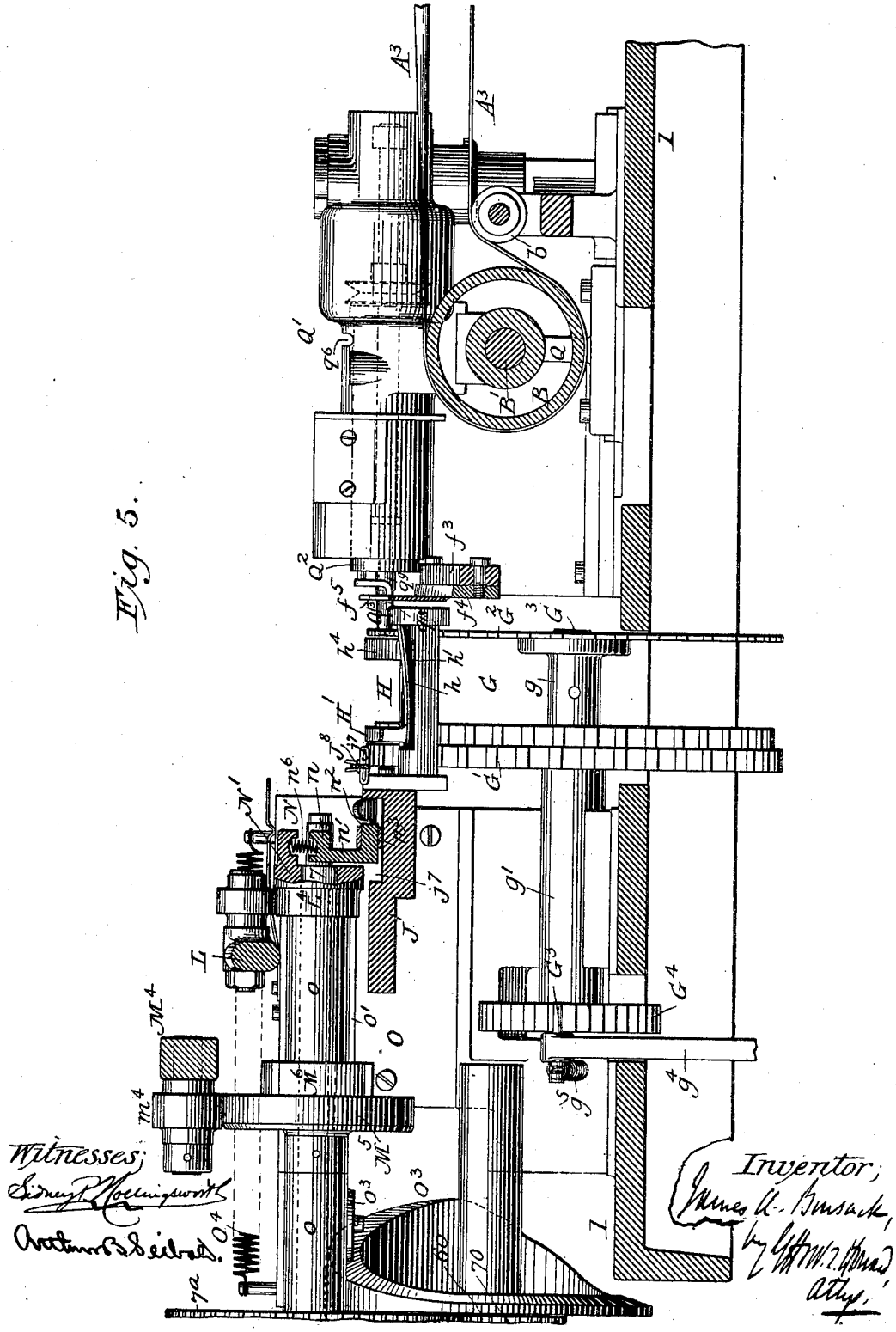
CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.)

16 Sheets—Sheet 4.

Fig. 5.



Witnesses;
Sidney R. Hollingsworth
Wortman & Seibold.

Inventor;
James A. Bonsack,
by Clifton W. Wood
Atty.

No. 672,348

Patented Apr. 16, 1901.

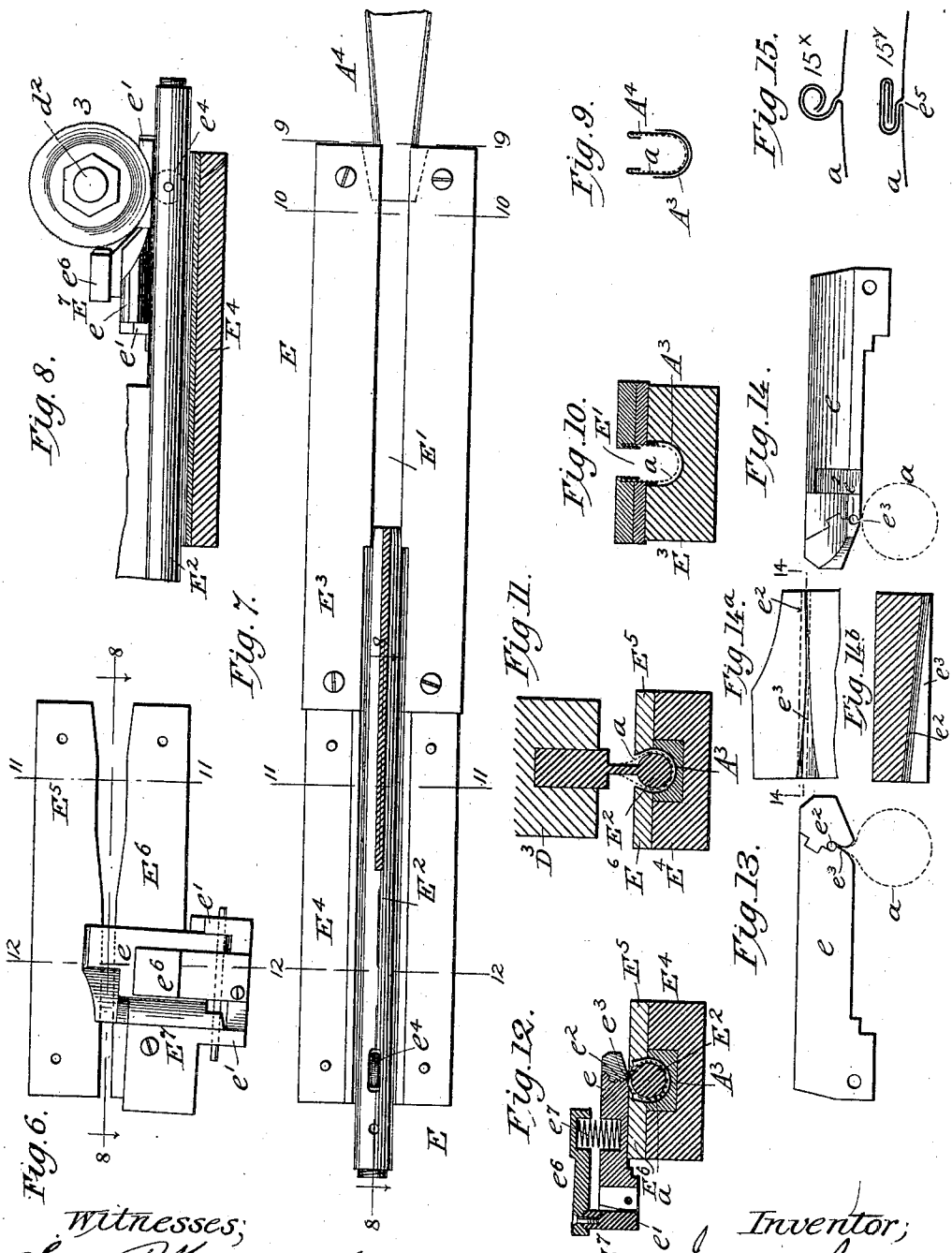
J. A. BONSACK.

CIGARETTE MACHINE.

(No Model.)

(Application filed Dec. 14, 1898.)

16 Sheets—Sheet 5.



Witnesses;
Sidney P. Hollingsworth
Arthur B. Seibold.

Inventor;
James A. Bonsack,
by Geo. W. Maud
Attys.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 6

Fig. 16.

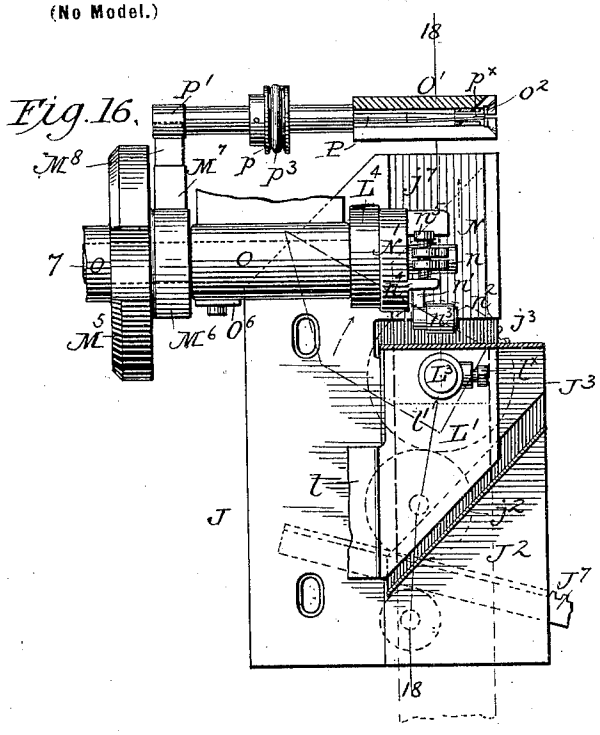


Fig. 17.

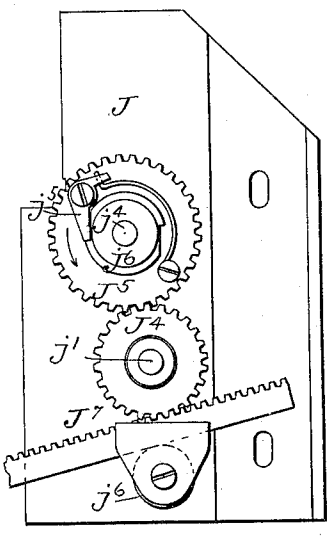
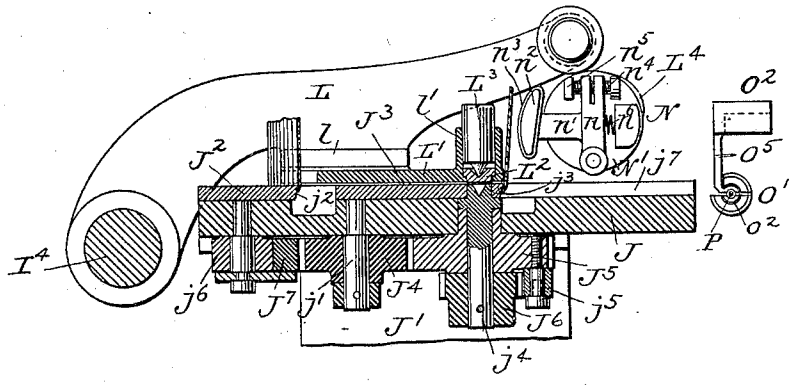


Fig. 18.



Witnesses:
Sidney P. Hollingsworth
Arthur B. Shubael.

Inventor:
James A. Bonsack,
by Gifford T. Howard,
Atty.

No. 672,348.

Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.)

16 Sheets—Sheet 7.

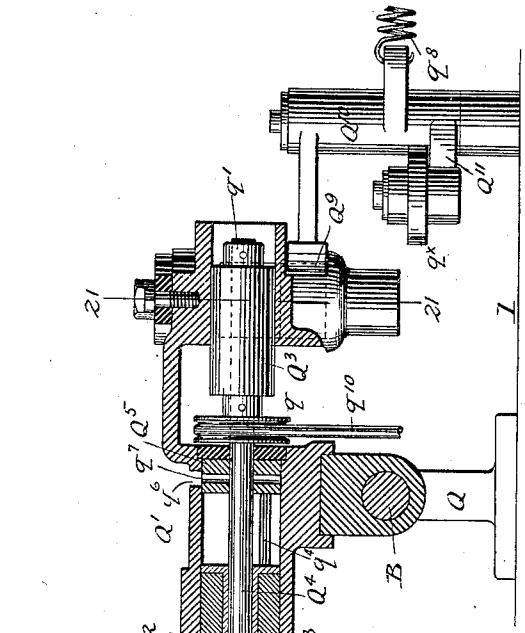


Fig. 19.

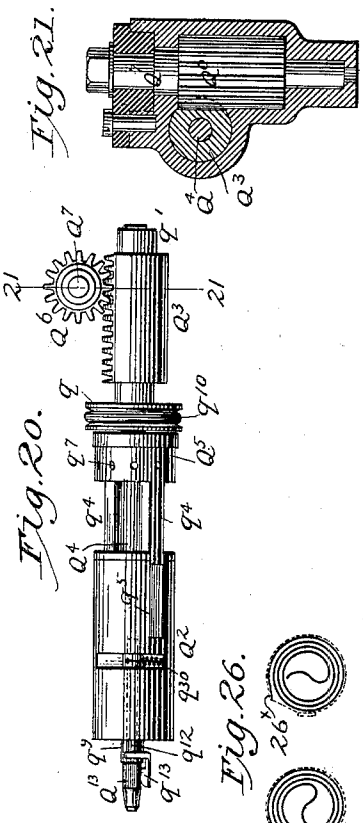


Fig. 20.

Fig. 21.

Fig. 26.

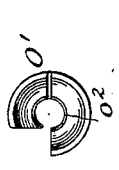


Fig. 25.

Fig. 23.

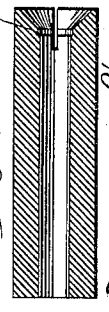


Fig. 24.

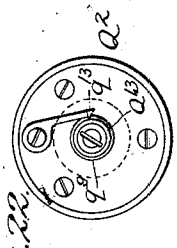
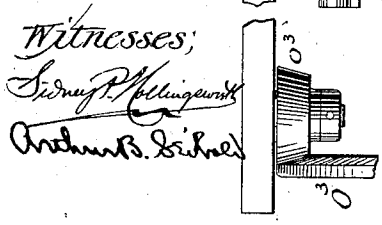


Fig. 22.



Witnesses;

Sidney P. Mellingewalk

Arthur B. Dibble

Inventor;

James A. Bonsack,

by Geo. W. T. Bonsack

Atty.

No. 672,348.

Patented Apr. 16, 1901.

J. A. BONSACK.

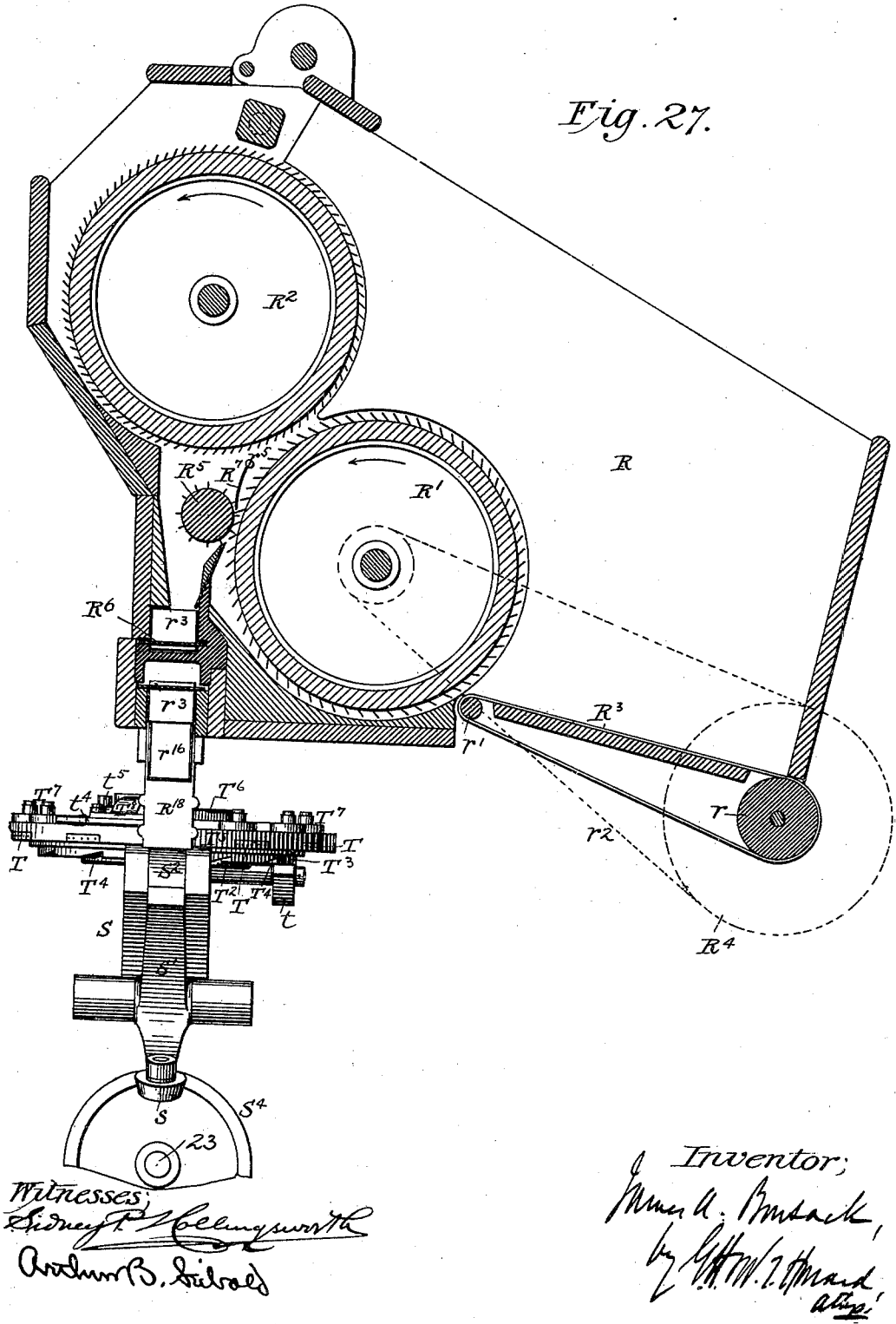
CIGARETTE MACHINE.

(No Model.)

(Application filed Dec. 14, 1898.)

16 Sheets—Sheet 8.

Fig. 27.



Witnesses;
Sidney F. Hollingsworth
Arthur B. Siebold

Inventor;
James A. Bonsack,
by Gifford W. & Ward
Attys.

No. 672,348.

Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(No Model.)

(Application filed Dec. 14, 1898.)

16 Sheets—Sheet 9.

Fig. 29.

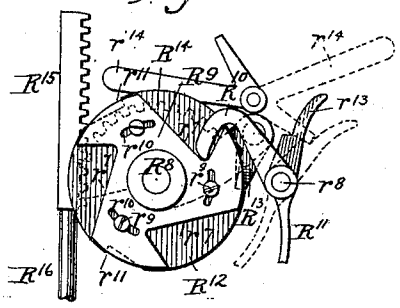
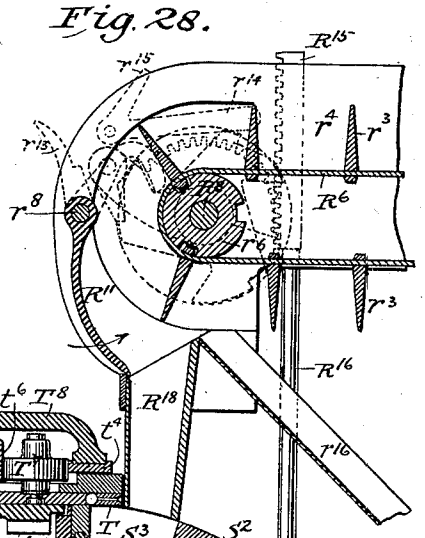
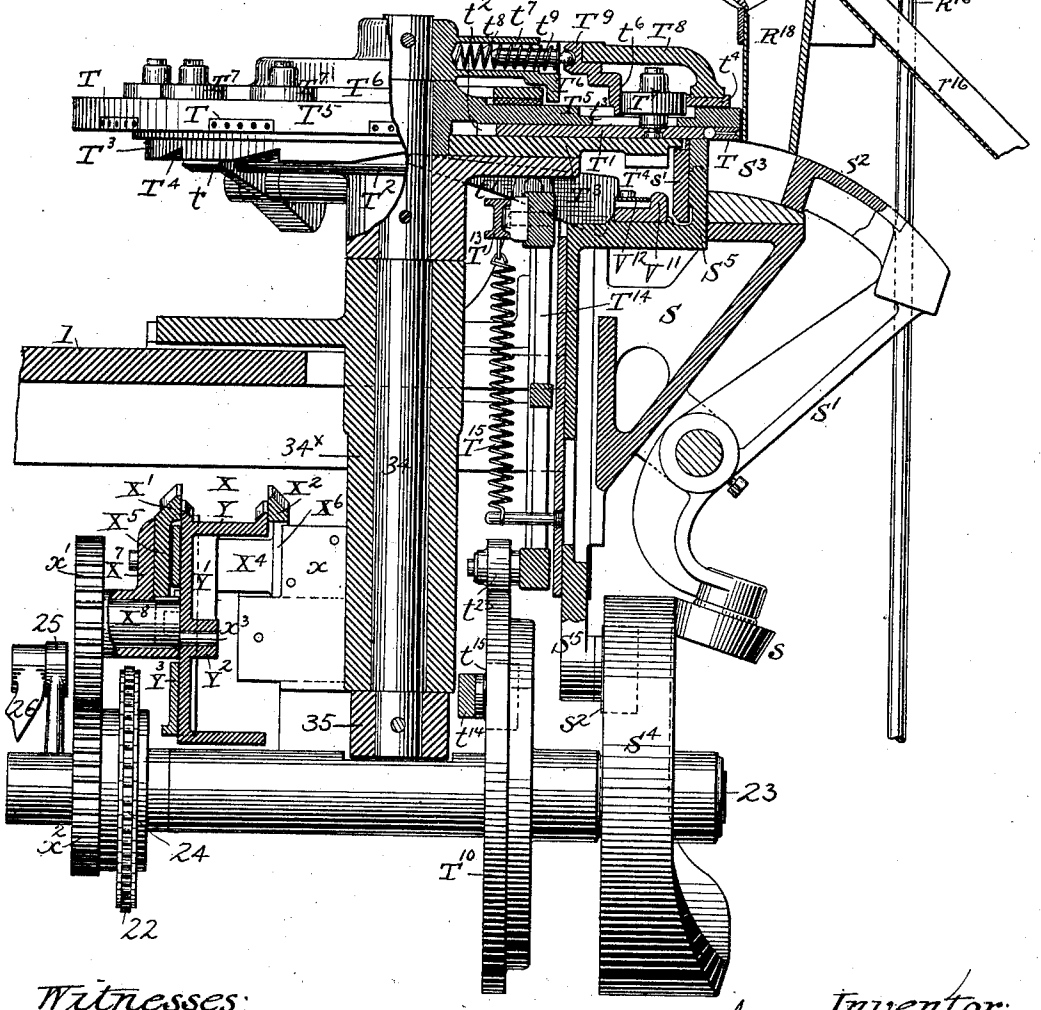


Fig. 28.





Witnesses;

Sidney P. Hollingsworth

Arthur B. Siebold.

Inventor.

James A. Bonsack,

by Gifford & Howard

attys.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 10.

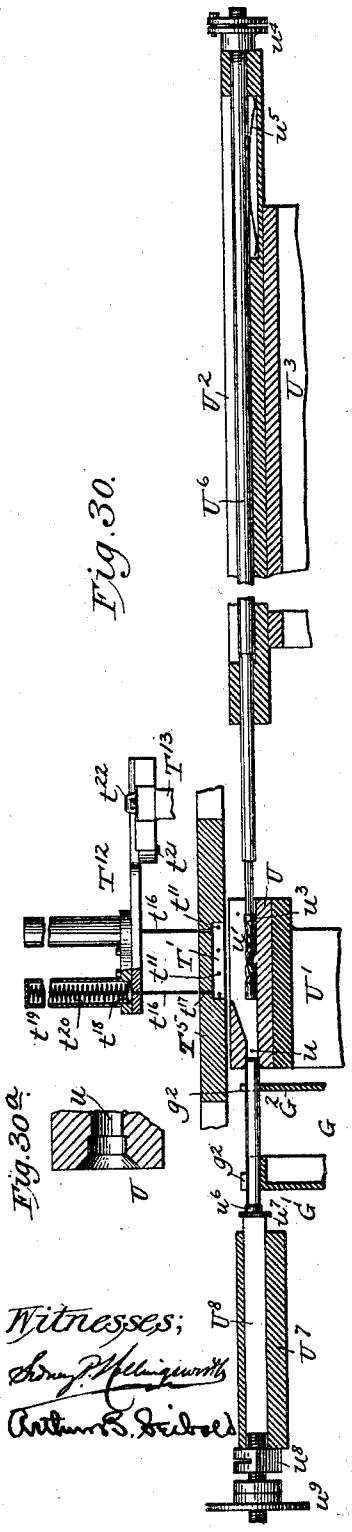


Fig. 30.

Fig. 30a.

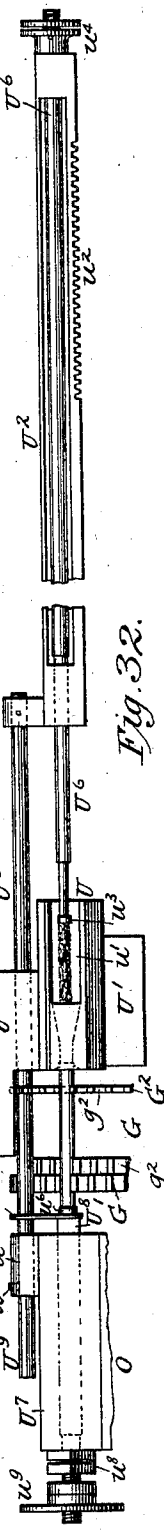


Fig. 31.

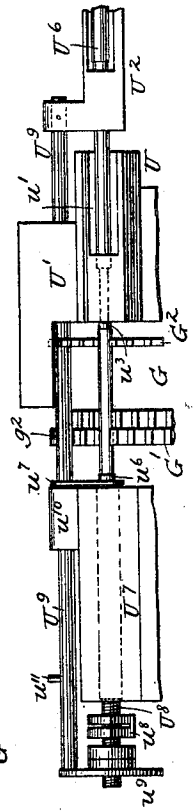


Fig. 32.

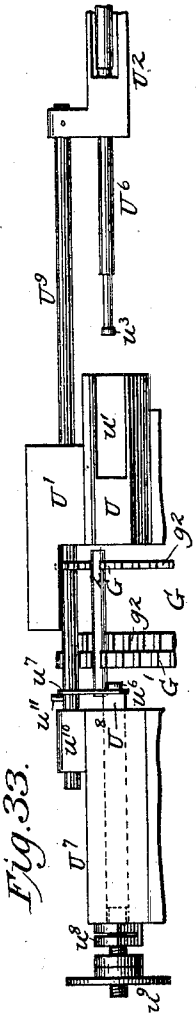


Fig. 33.

Witnesses;

Arthur B. Seibold

Inventor;

James A. Bonsack,

by Wm. T. Howard,

Atty.

No. 672,348. Patented Apr. 16, 1901.

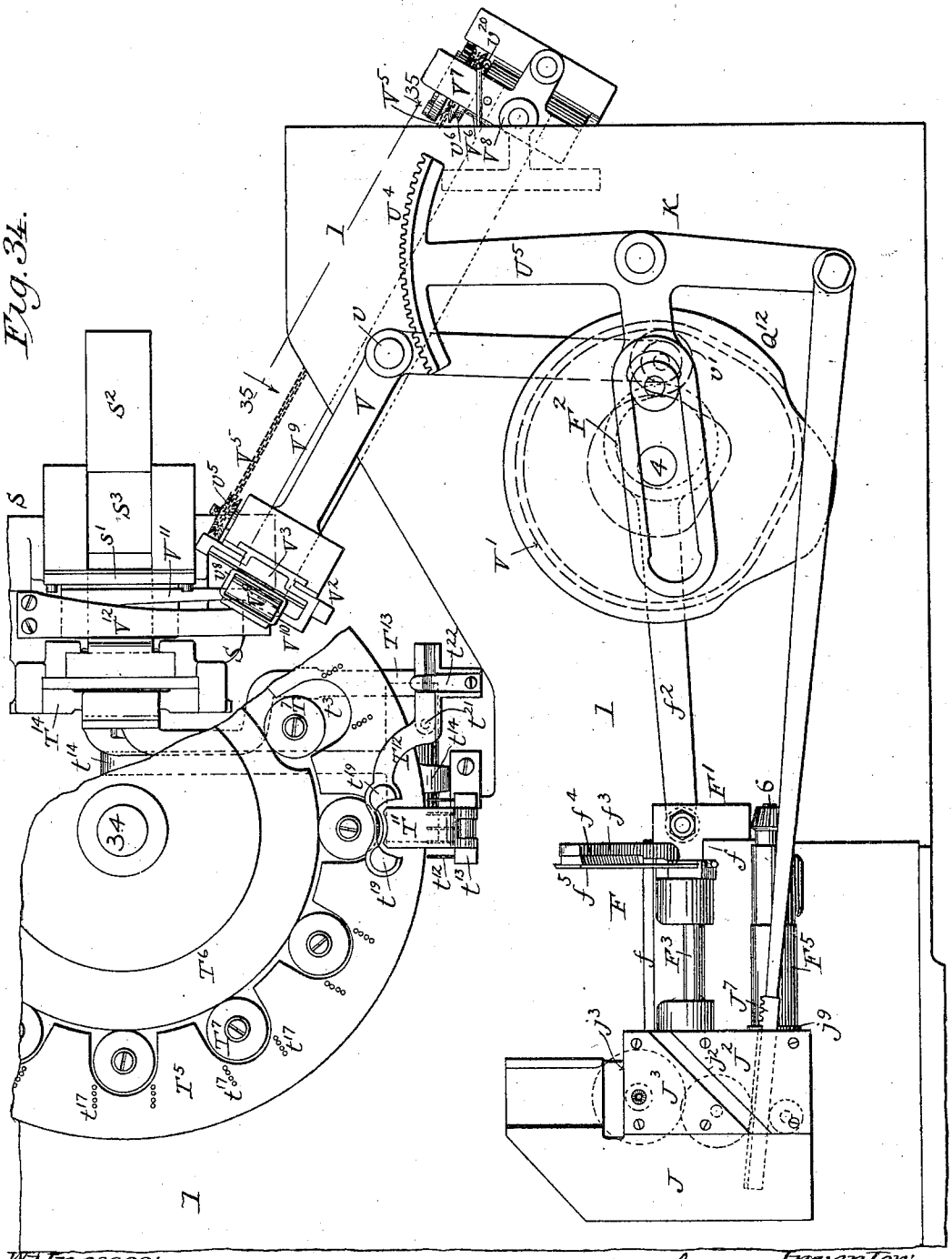
J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 11.

Fig. 34.



Witnesses:
Sidney P. Hollingsworth
Arthur B. Gilroy.

Inventor:
James A. Bonsack,
by Geo. W. T. Howard Atty.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 12.

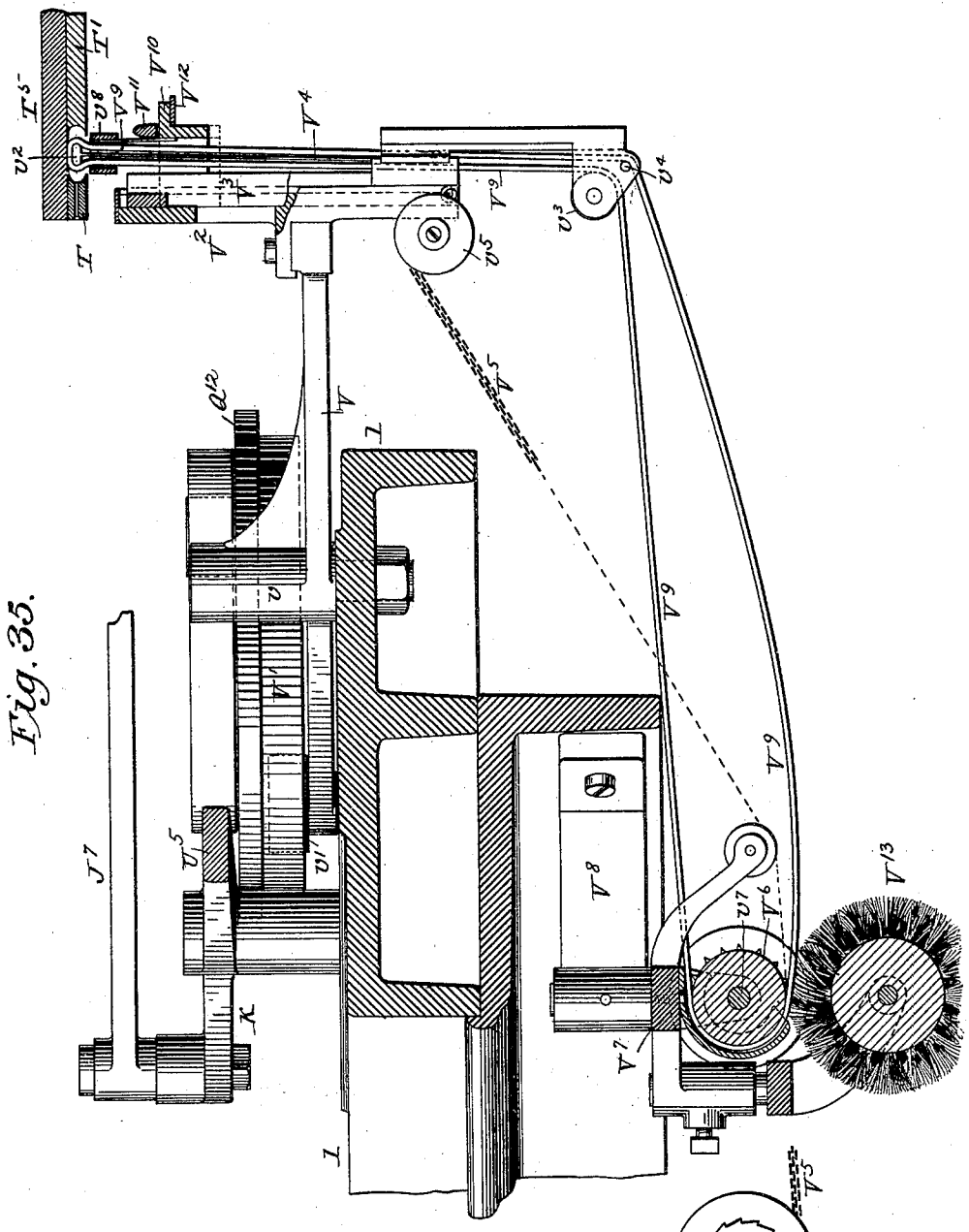


Fig. 35.

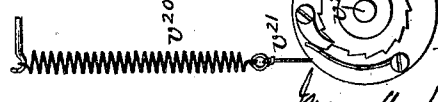


Fig. 36.

Witnesses:
Sidney P. Hollingsworth
Arthur B. Fulwood.

Inventor:
James A. Bonsack,
by Wm. W. J. Howard
Attys.

No. 672,348. Patented Apr. 16, 1901.

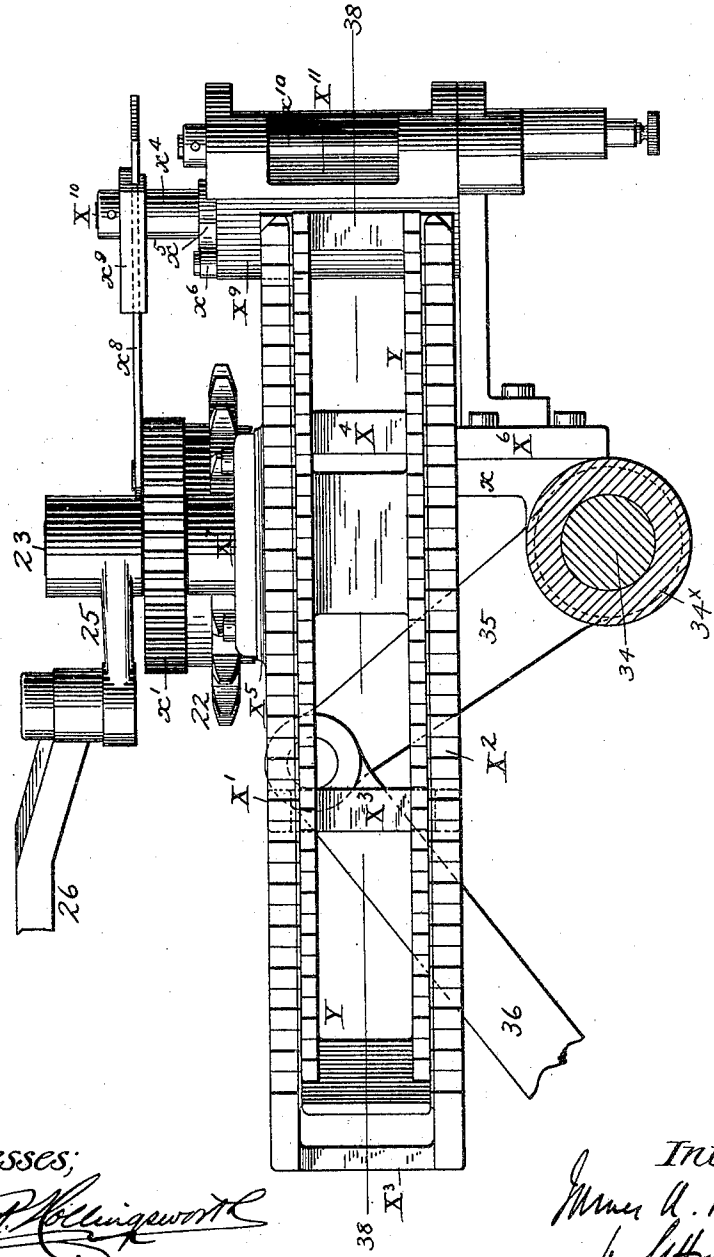
J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 13.

Fig. 37.



Witnesses;
Sidney P. Hollingsworth
Abraham B. Seibold.

Inventor;
James A. Bonsack,
by Gifford & Howard
Attys.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 14.

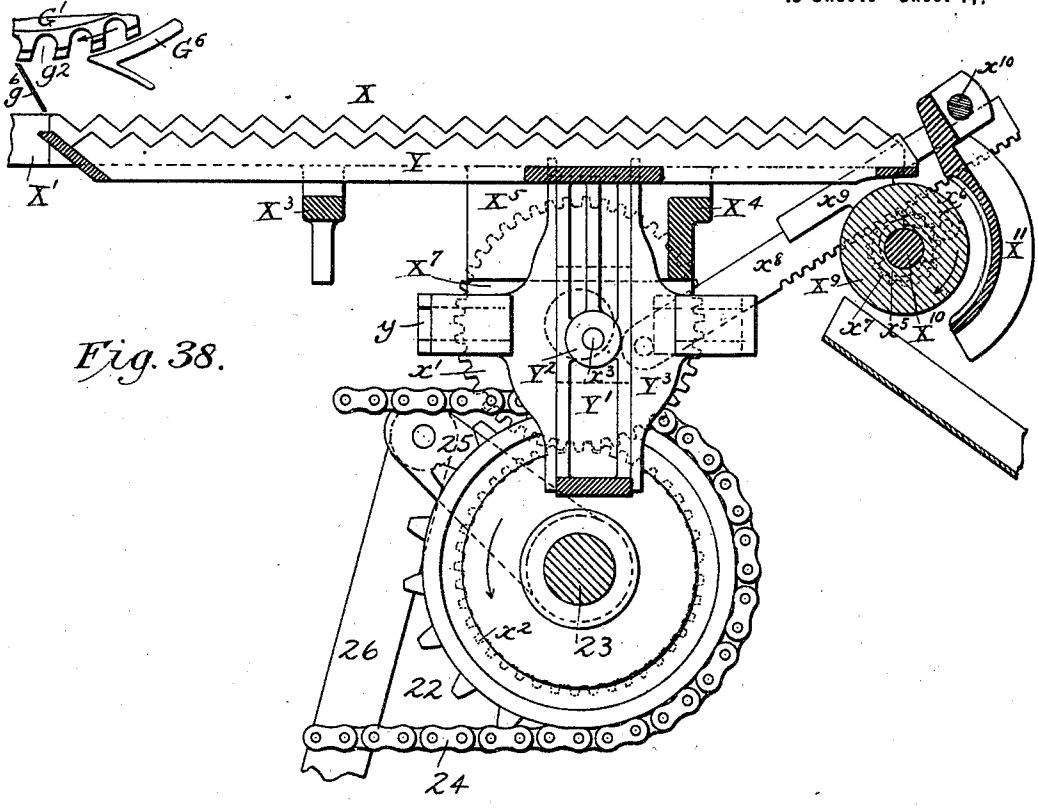


Fig. 38.

Fig. 39.

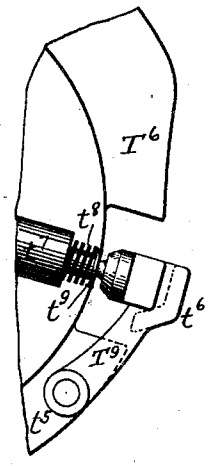
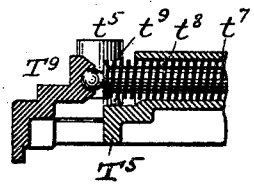


Fig. 40.



Witnesses;
Sidney P. Hollingsworth
Arthur B. Siebold.

Inventor:
James A. Bonsack,
by G. H. W. T. Howard
Atty.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 15.

Fig. 41.

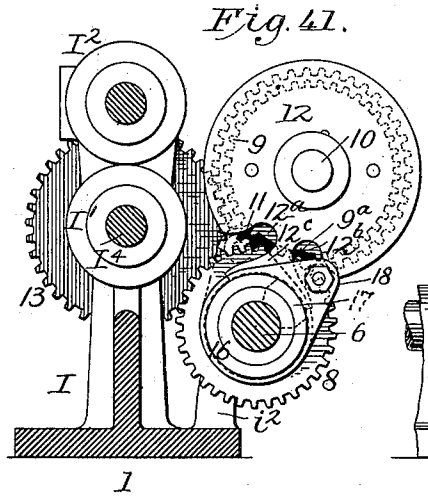


Fig. 42.

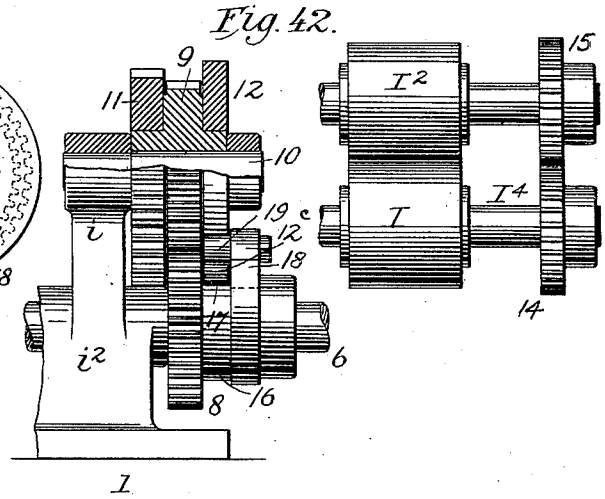


Fig. 43.

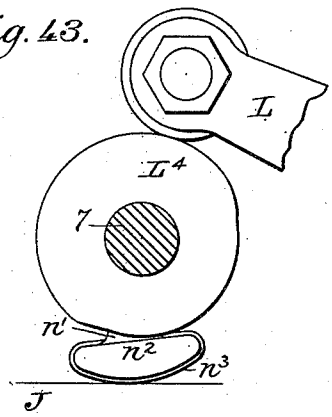


Fig. 44.

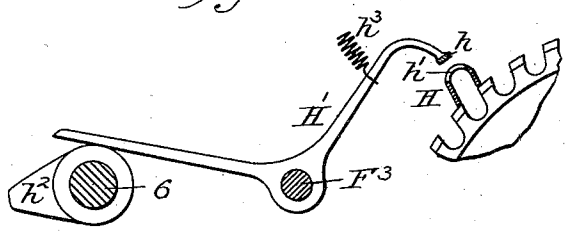
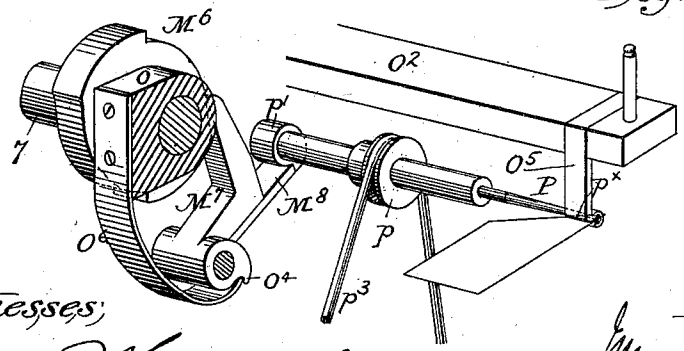


Fig. 45.



Witnesses;

Sidney P. Hollingsworth

Arthur B. Siebel.

Inventor;

James A. Bonsack,

by G. H. W. T. Howard

atty.

No. 672,348. Patented Apr. 16, 1901.

J. A. BONSACK.

CIGARETTE MACHINE.

(Application filed Dec. 14, 1898.)

(No Model.) 16 Sheets—Sheet 16.

Fig. 47.

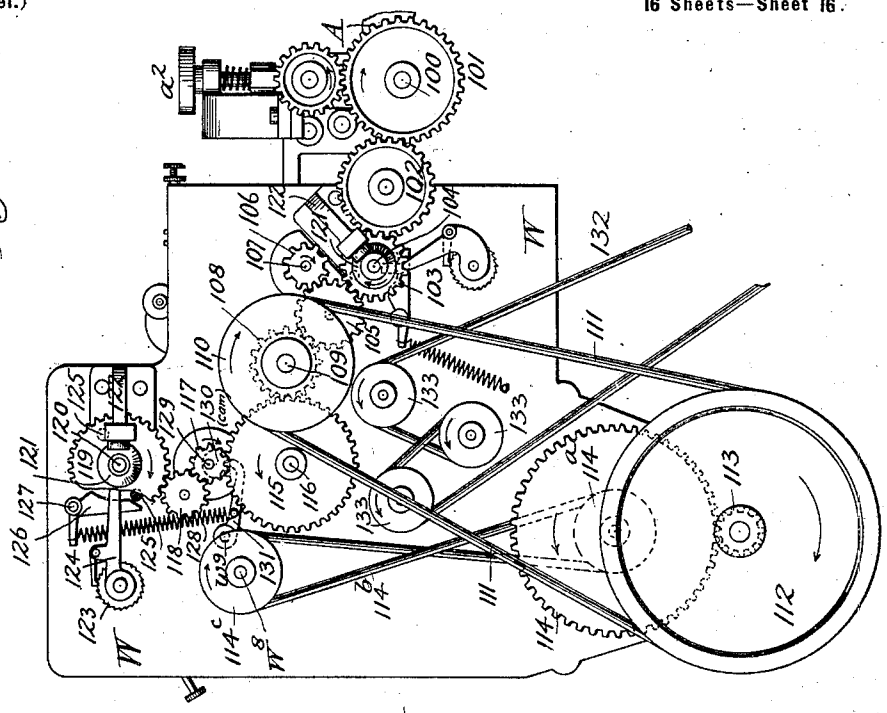
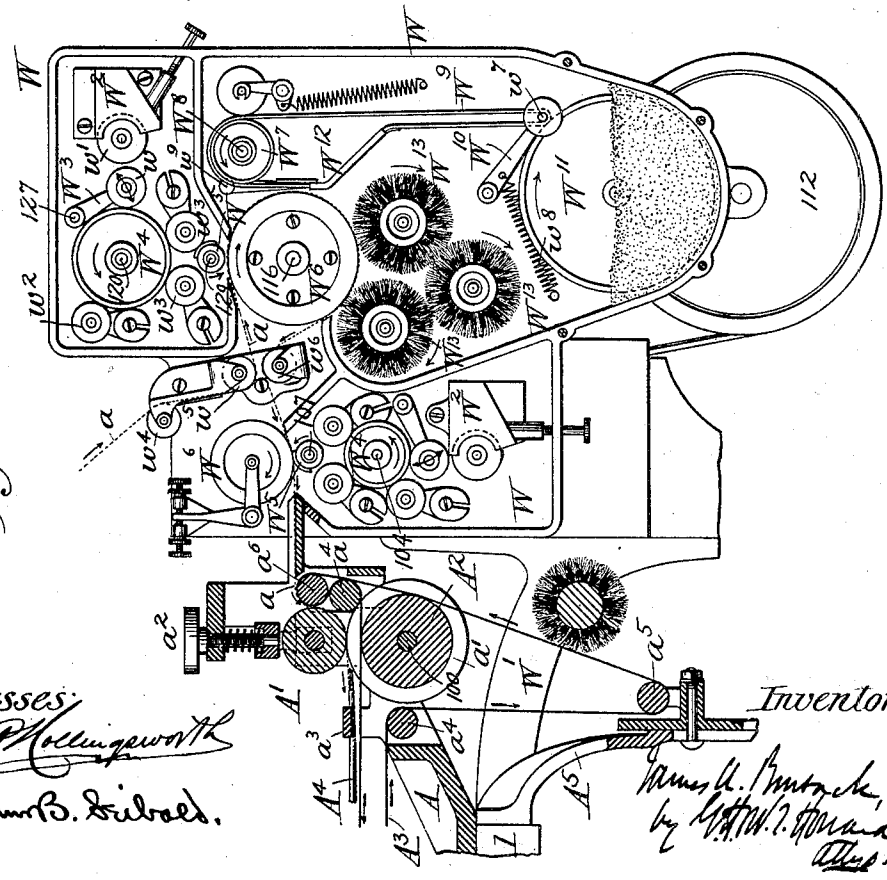


Fig. 46.



Witnesses:
Sidney P. Hollingsworth
Arthur B. Seibold.

Inventor.
James A. Bonsack,
by Wm. C. Howard
Atty.

UNITED STATES PATENT OFFICE.

JAMES A. BONSACK, OF PHILADELPHIA, PENNSYLVANIA.

CIGARETTE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 672,348, dated April 16, 1901.

Application filed December 14, 1898. Serial No. 699,282. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BONSACK, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Cigarette-Machines, of which the following is a specification, reference being had to the accompanying drawings and to the letters and numerals of reference marked thereon.

My invention relates to mechanism for automatically manufacturing cigarettes of the variety known as "Russian mouthpiece-cigarettes," in which a reeled web of paper for forming the wrappers is carried through suitable devices, whereby it is folded and its edges are united to form a continuous tube, which is subsequently cut into proper lengths by means provided for that purpose. Each tubular wrapper thus formed is carried in line with the mouthpiece-forming mechanism, which having separated a length of stout paper from a continuous web and rolled it into a tubular form introduces it into one end of the tubular wrapper. While these movements are progressing, tobacco from a suitable receptacle is fed onto a movable receiving-surface divided by partitions into equal spaces, so that a uniform quantity of tobacco will be received in each subdivision, the said quantities of tobacco being fed successively to a compressing mechanism, whereby each portion is condensed sufficiently to be introduced into a mold formed on a rotating disk, which mold shapes the condensed tobacco into a filler of the proper size and form and holds it under compression for a certain time to give it a temporary "set." The filler is then removed from the mold and pushed endwise into the cigarette-tube placed in position to receive it. The cigarette is then dropped onto a delivering mechanism, which carries it to a rolling device, which perfects its shape before ejection from the machine.

In connection with the wrapper-feed mechanism I have arranged an apparatus for printing or printing and bronzing letters and characters on the web before it passes through the feed-rolls, the printing being so spaced as to appear in the same position on each finished cigarette.

To more clearly understand the invention, attention is called to the drawings accompanying this description, in which—

Figure 1 is a plan view of a cigarette-machine embodying my invention. Fig. 2 is a cross-section of the same on the line 2 2 of Fig. 1. Fig. 3 is a similar section on the line 3 3 of the same figure. Fig. 4 is a horizontal section on the line 4 4 of Fig. 2. Fig. 5 is a vertical longitudinal section, on an enlarged scale, through the left-hand end of the machine on the lines 5 5 of Figs. 1, 2, and 3. Fig. 6 is a plan view of the wrapper-tube-folding device. Fig. 7 is a plan view of the channel-way through which the wrapper passes to the folding device. Fig. 8 is a vertical longitudinal section on the line 8 8 of Figs. 6 and 7 looking in the direction of the arrows. Figs. 9, 10, 11, and 12 are cross-sections on the lines 9 9, 10 10, 11 11, and 12 12 of the same figures. Figs. 13 and 14 are enlarged views of the wrapper-edge-folding device viewed from opposite sides. Fig. 14^a is a bottom view of the forward end of the same device. Fig. 14^b is a cross-section on the line 14 14, Fig 14^a. Fig. 15 is an enlarged view of the fold uniting the edges of the wrapper. Fig. 16 is a plan view of the mouthpiece-blank cutting and winding mechanism. Fig. 17 is an under view of the same. Fig. 18 is a longitudinal section on the line 18 18 of Fig. 16. Fig. 19 is a longitudinal vertical section on the line 19 19 of Fig. 1, showing the mouthpiece winding and inserting mechanism. Fig. 20 is a plan view of a detail shown in Fig. 19. Fig. 21 is a section on the line 21 21 of Figs. 19 and 20. Fig. 22 is an end view of the part shown in Fig. 20 enlarged. Fig. 23, 24, and 25 are views of the sleeve within which the mouthpiece is formed. Fig. 26 is an end view of two mouthpieces, showing variations in the wound mouthpiece, as hereinafter explained. Fig. 27 is a cross-section through the tobacco-feeding mechanism. Fig. 28 is a section on the line 28 28, Fig. 1, illustrating the filler-forming mechanism. Fig. 29 is a detail view of a part of Fig. 28. Fig. 30 is a vertical longitudinal section through the mechanism for inserting the filler into the cigarette-tube. Fig. 30^a is a sectional view of a detail of the above mechanism. Fig. 31 is a plan view of the mechanism shown in

Fig. 30. Figs. 32 and 33 are similar views showing the parts in different positions. Fig. 34 is a plan view of the bed-plate and certain mechanisms connected thereto. Fig. 35 is a section through the bed-plate on the line 35 35 of Fig. 34 looking in the direction of the arrows. Fig. 36 is a detail view of a portion of the mechanism shown in Fig. 35. Fig. 37 is a plan view of the cigarette-delivering mechanism. Fig. 38 is a longitudinal sectional view on the line 38 38 of Fig. 37. Figs. 39 and 40 are detail views of the cams for operating the filler-mold. Figs. 41 and 42 are views illustrating the stop or mutilated gear mechanism used in connection with the rolls for feeding the mouthpiece material. Fig. 43 is a view illustrating one of the operating-cams. Fig. 44 is a view of the cigarette-tube guide and attendant parts. Fig. 45 is a perspective view of the mouthpiece-winding device. Fig. 46 is a front elevation of the printing apparatus with the front removed, showing the interior arrangement. Fig. 47 is a rear elevation of the same.

Similar letters and numerals of reference indicate the same parts in the various figures.

On a bed-plate 1, supported by legs 2, are secured the various mechanisms for forming the tubular wrapper, mouthpiece, and filler and assembling these several parts successively into a complete cigarette and finally delivering it into a suitable receptacle. At the right-hand end of the bed-plate 1 and bolted thereto is a bracket A, Figs. 1 and 46, and journaled in bearings thereon are two feed-rolls A′ A^2 for drawing the web *a* of wrapper material from a reel. (Not shown.) The lower roll A^2, which is of greater diameter than the upper one, A′, has a groove *a′* in its center to permit the belt A^3 to pass without coming in contact with or being engaged by the rolls. The web *a*, which is slightly wider than the belt A^3, is thus grasped only at its edges between the rolls A′ A^2, a hand-screw a^2 being employed to separate the rolls. Fixed to a bar a^3, attached to the bracket A, is a trough-shaped guide A^4, through which the wrapper passes to the tube-forming device and by which it is bent into U form. Idle rollers a^4 a^6 are pivoted in the bracket A, around which the belt A^3 passes, while an idle roller a^5 is journaled in an adjusting device on a bracket A^5, fixed to the bed-plate, for maintaining the tension of the belt. The belt A^3 after running around the idle rollers a^4 a^5 a^6, as shown, passes horizontally beneath the trough-shaped guide A^4 and in line therewith through the tube-forming device to and around a pulley B on a horizontally-disposed transverse shaft B′, turning in bearings on the bed-plate 1. After passing around the pulley B the belt A^3 returns over an idler *b* to the starting-point.

Attached to the upper surface of the bed-plate 1, as indicated in Fig. 1, between the bracket A and the pulley B, is a horizontal plate C, to which is bolted a second plate D, having an arm *d* projecting toward the pulley B. Gear-wheels D′ D^2, engaging each other, turn on studs attached to one side of the arm *d*, the gear-wheel D′ being driven by wheel B^2, mounted on the transverse shaft B′. In the construction illustrated the wheel B^2 is formed as an extension of the pulley B. A block D^3, screwed to the second plate D, gives support to a short cross-shaft *d′*, on which a forked bracket D^4 is adapted to rock. This forked bracket D^4 carries a shaft d^2, lying parallel to the cross-shaft *d′*, said shaft d^2 having on one end a pinion meshing with the wheel D^2 and on the other end a serrated disk or crimping-wheel 3. Beneath or in a lower plane than the crimping-wheel 3 is the tube-forming device (indicated as an entirety by E) which shapes the wrapper into tubular form, folds the contiguous edges, and in connection with the crimping-wheel firmly unites the folded edges. The crimping-wheel 3 is held against the fold or seam of the wrapper-tube by means of a spring d^3, connected to a finger d^4, projecting from the forked bracket D^4, and to an arm on the plate C.

The web *a* passes from the trough-shaped guide A^4 into a channel E′, Figs. 1, 7, 9, 10, 11, and 12, in the tube-forming device E. Within the channel and supported by the block D^3 is a mandrel E^2, having a diameter substantially equal to that of the cigarette-filler, around which mandrel the continuous tube is formed. The channel E′ passes longitudinally through a fixed block E^3 and a removable block E^4, the latter block giving support to two plates E^5 E^6, held in place thereon by pins, which arrangement admits of the easy removal of the plates when necessary. Screwed to the plate E^6 is the edge-folder E^7, Figs. 6, 8, 12, 13, 14, 14^a, and 14^b, which consists of a part *e*, pivoted to a supporting-plate *e′*, fastened to the plate E^6. Diagonally downward through the forward end of and across the part *e* is bored a preferably cylindrical hole e^2, from which a narrow tangential slot e^3 extends to the under surface of said part *e*, preferably at an angle of sixty degrees thereto. The diagonal direction of the cylindrical hole is substantially as shown in Figs. 14^a and 14^b. By this construction the edges of the wrapper which project above the plates E^5 E^6, as seen in Fig. 11, enter the tangential slot e^3 of the part *e* on the side shown in Fig. 13 and emerge on the opposite side, Fig. 14. The cylindrical hole e^3, by reason of its position and direction, turns or folds the edges of the wrapper in the manner represented at 15^x, Fig. 15. The mandrel E^2 is cut away at a point immediately in front of the part *e* and a small corrugated wheel e^4 pivoted therein, the upper surface of its periphery being slightly above the upper surface of the mandrel. The corrugated crimping-wheel 3, which is directly above said corrugated wheel e^4, Fig. 8, coacts with it and presses or crimps the fold into the form

shown at 15^y, Fig. 15, as soon as it emerges from the folder. The edge-folder E^7 is screwed to the plate E^6 in such position that the axis of the cylindrical hole e^2 is substantially in the same vertical plane as the axis of the wrapper-tube, Figs. 13, 14, 14^a, and 14^b, the purpose being to make the seam of the tube parallel with its sides or axis. A finger e^6 overhangs the part e, between which a light spring e^7 is placed to keep the said part down to its work.

The continuous wrapper-tube, constructed as above described, is drawn through the tube-forming mechanism E by the bite of the crimping-wheels 3 e^4 on the seam of the tube. The peripheral speed of the crimping-wheels is but little faster than the peripheral speed of the feed-rolls A' A^2, the result being that the web a is always kept taut, the crimping-wheels slipping when the strain on the web reaches a given tension. In this connection it is to be noted that the web a is fed to the feed-rolls A' A^2 over the roller a^6 in order that it may pass partly around the roll A' and be straightened before it is gripped by the roll A^2. Experience has shown that when the web, as in the present case, is held by its edges only between the rolls, if it is fed in a straight line it will not pass evenly through the rolls, but will wrinkle and run off, which difficulty I have overcome in the manner described. After passing the crimping-wheels the continuous wrapper-tube moves onward in a straight line, passing into a rotary carrier G, and a sufficient length of the wrapper-tube to form a cigarette having entered said carrier a cutting mechanism F severs such length from the continuous tube.

The tube-cutting mechanism comprises a plate F', Figs. 1, 2, 5, and 34, adapted to slide in guides f on the bed-plate 1, the movement of an eccentric F^2 on a vertical shaft 4 operating a rod f^2, connected to the sliding plate F', Figs. 1, 2, and 34. Extending upwardly from the plate F' and at an angle thereto is an arm f^3, having an attached cutting-blade f^4. In bearings on the plate F' and adapted to rock therein is a shaft F^3, to which is pivoted a blade f^5, adapted to coact with the stationary blade f^4. A finger F^4, also attached to the rock-shaft f^3, is held against a cam F^5 on a shaft 6 by a spring f^6, the rotation of the shaft 6 causing the cam F^5 to actuate the blade f^5 and sever the wrapper-tube. The vibratory blade f^5 is held against the stationary blade by means of a spring f^7, which draws against the former, as shown more particularly in Fig. 1. The reciprocating action of the knife is so timed that when it is moving in unison with or a little faster than the continuous wrapper-tube a length sufficient to form a cigarette has passed between the blades of the cutter, which are then quickly closed, severing a section and pushing it to place in the rotary carrier G. The tube being empty the knife flattens it before cutting off a section. This being so the necessity of perfect harmony of movement between the tube and knife is not required, and better results are obtained when the knife moves a little faster than the tube, as danger of crushing the end of the tube by butting against the knife is avoided.

The rotary carrier G, Figs 1, 2, and 5, consists of a flanged disk G' and a flat disk G^2, spaced a suitable distance apart and connected at their centers by a hub g, through which passes a shaft G^3, fixed therein by means of a pin, the said shaft being journaled in a bearing g' on the bed-plate 1. The periphery of each disk G' G^2 is provided with notches g^2, as shown, slightly larger than the diameter of a cigarette and semicircular on the bottom. These notches form supports for the cigarette-tubes after being separated from the continuous wrapper-tube. The rotary carrier G is advanced step by step by means of a ratchet-wheel G^4, having as many teeth as there are notches in the carrier, fixed on the shaft G^3. A pin g^3 on a reciprocating bar g^4 engages with and operates the ratchet-wheel G^4, the reciprocating bar being driven by a cam G^5 on the shaft 5 beneath the bed-plate 1, Figs. 3 and 4. A spring g^5 retains the pin g^3 in engagement with the ratchet-wheel G^4.

Secured to a fixed portion of the machine above the rotary carrier G and in line with the wrapper-tube is a guide H, Figs. 1 and 44, which serves to keep the severed portion of the wrapper-tube in position, so that it cannot fail to enter a notch g^2 of each disk of the rotary carrier. To insure the entrance of the cigarette-tube into a notch g^2, a lever H' is pivoted loosely on the shaft F^3 of the cutting mechanism, one end of which extends upwardly and terminates in a footpiece h, adapted to pass through a slot h' in the top of the guide H. The other end of the lever H' is moved by a cam h^2, secured to the shaft 6. A spring h^3, attached to the lever H' and to some fixed point, serves to withdraw the footpiece from the guide H after the cam h^2 ceases to act. A curved finger h^4, having the same radius as that of the disk G^2, lies close to the inner side of said disk and extends from the guide H, to which it is attached, a short distance in the direction of rotation of the rotary carrier G, said finger serving to prevent the accidental displacement of the cigarette-tubes which pass under it in the rotary carrier. The rotary carrier G, advancing intermittently as the cigarette-tubes are placed within the peripheral notches g^2, brings each one in turn in position for the insertion of a mouthpiece, the mechanism for cutting, winding, and placing which within a cigarette-tube will now be described.

Bolted to the bed-plate 1 at the front and near the left-hand end is a standard I, Figs. 1, 2, and 3, having bearings for feed-rolls I' I^2, placed one above the other. A curved guide I^3, placed in front of the said rolls, leads the web i of mouthpiece material—usually a heavier paper than that of the cigarette-tube—

from a reel (not shown) placed conveniently to the feed-rolls. Behind the feed-rolls I' I² is a table J, over which the mouthpiece-paper travels to the winding device, the table J being supported on a standard J' in a horizontal position above the bed-plate 1. On the top of the table J are fastened two steel plates or cutting-blades J² J³, Figs. 16 and 18, the former having an edge j^2 at an angle of about forty-five degrees to the direction of travel of the paper, while the cutting edge j^3 of the latter plate is at a right angle thereto. A stud j' is fixed to and projects from the bottom of the table J, a gear-wheel J⁴ being mounted on the stud and adapted to rotate thereon. The gear-wheel J⁴ engages a second gear-wheel J⁵, adapted to turn loosely on a pin j^4, passing through and extending below the table J, and having fixed to it a ratchet-wheel J⁶, which connects with the gear-wheel J⁵ by means of the pawl j^5, Fig. 17. A rack-bar J⁷, held in connection with the gear-wheel J⁴ by means of an antifriction-roller j^6, is secured to and operated by one arm of a three-armed lever K, hereinafter described, pivoted to the bed-plate. The movement of the rack-bar to the right causes the gear-wheels J⁴ J⁵ to rotate, and the pawl engaging the ratchet-wheel will rotate the pin j^4 to the right. The upper end of the pin j^4, which is flattened and roughened, passes through the plate J³ just back of the cutting edge j^3, Figs. 18 and 34, and projects very slightly above its upper surface.

Pivoted loosely on the shaft I⁴ of the lower feed-roll I' and to the left thereof is a curved arm L, Figs. 1 and 18, from which a lug l extends toward the table J. To the under side of this lug is secured a cover-plate L', which extends above that portion of the plate J³ over which the web i passes. A socket l' is formed on the cover-plate L', in which socket is seated a button L², the lower surface of which extends a slight distance below the bottom of the cover-plate. The button L² is situated, when the parts are in normal position, axially above the pin j^4. The button is held in place by a pivot-pin L³, fixed against movement by a screw $l^\times$. To permit the button to rotate with the least possible friction, the lower end of the pivot-pin L³ is made pointed and is seated in a conical depression in the button L², having an angle wider than the pivot-point, so that only the extreme point of the pin will bear on the button.

When the feed-rolls rotate to advance the paper, the curved arm L is elevated by a cam L⁴, mounted on the shaft 7, sufficiently to raise the cover-plate L' and button L² free from the mouthpiece material and allow it to advance; but as soon as a sufficient quantity to form two mouthpiece-blanks has been fed by the rolls the latter are stopped and the curved lever is lowered, when the paper will be held firmly between the roughened end of the pin j^4 and the button L². The means for performing these operations are further described hereinafter.

A bracket M, Figs. 1, 2, and 3, bolted to the front edge of the bed-plate, extends upwardly therefrom for a short distance, and to the bracket is pivoted a knife-carrying lever M', which curves rearwardly over the table J. To the free end m of said lever are pivoted two flat knives M² M³, which reach downwardly and coact with the edges j^2 j^3 of the plates or cutting-blades J² J³, the angular position of the knives corresponding to that of the cutting edges j^2 j^3. The upper end of each knife is secured to a hinge-plate m', pivoted to a flat hinge-plate m^2, one of the latter being fastened to the upper and one to the lower side of the knife-carrying lever M'. A spring m^3 between the plates m' m^2 of each hinge tends at all times to keep the cutting edges of the knives in contact with the respective cutting edges j^2 j^3.

On an arm M⁴, which projects laterally from the knife-carrying arm M, is a roller m^4, operated by a cam M⁵, fixed on the shaft 7.

Each rotation of the feed-rolls I' I² advancing paper sufficient for two mouthpieces in less time than is required to make one cigarette, means are employed to stop the feed-rolls for a definite period. Such means are shown in Figs. 1, 41, and 42 and consist of a gear-wheel 8 on the shaft 6, meshing with a slightly-larger gear-wheel 9, adapted to turn loosely on a stud 10, fixed in a bracket i, extending upwardly from one of the bearings i^2 of the shaft 6. A gear-wheel 11 is attached to the gear-wheel 9 on the outside, while a disk 12, fastened to the inside thereof, is formed with notches 12^a 12^b, one being on each side of a fork-like projection 12^c. A gear-wheel 13 on the shaft of the lower feed-roll I' is turned by the gear 11, and through the equal gears 14 15 motion is imparted to the upper feed-roll I². On the shaft 6, below the disk 12, is mounted a collar 16, having a peripheral opening 17 therein and also a hub on which is secured an arm 18, provided with a roller 19, projecting over the collar 16. The parts being in the position shown in Fig. 41, the shaft 6 will make the greater part of a revolution without turning the gear 9, as the teeth are omitted from the portion 9^a thereof. As the arm 18 reaches the position indicated by dotted lines the roller 19 engages the notch 12^a of the disk 12 and rotates it until the teeth of the gears 8 and 9 become engaged, thus causing the feed-rolls I' I² to make one revolution and feed a length of paper equal to two mouthpiece-blanks, at which time the roller 19 will engage the notch 12^b and move the disk 12 to the position shown, the toothless portion 9^a of the gear 9 being next the gear 8. The roller 19 will pass out from the notch 12^b and the shaft 6 continue its rotation without turning the gear 9, which is held in position by the fork-like projection 12^c, riding on the collar 16, into the opening 17 of which a prong of the said foot-like extension enters when the roller is engaged with a notch. The curved arm L and the knife-carrying lever M' are

while the paper is passing raised by their respective cams; but as soon as the feed-rolls stop they are lowered, the curved arm L causing the paper to be held in position and the knives M^2 M^3 (attached to the lever M') cutting the blanks, the knife M^2 severing at an angle the double blank from the web of paper, while the knife M^3 at the same time divides the blank into two equal parts by a cut perpendicular to its length. After being cut the forward blank drops into a channel-way or guide j^7 in the table J, to be wound into tubular form by mechanism now to be described.

Fixed to the bed-plate 1 beyond the shaft 7 is the upright standard O, Figs. 1, 2 and 5, having bearings *o* for the said shaft. Bolted to the standard O at the end of the table J is a support *o'*, in which is placed a sleeve O', within which the mouthpiece is wound. The bore of the sleeve O' is a little less in diameter than the inner diameter of the cigarette-tube, except near the end facing the rotary carrier G, where the bore is enlarged, as at o^2, to the full diameter of the cigarette-tube and then flared to the end of the sleeve. Within the bore of the sleeve the winding-spindle P rotates, its outer and enlarged portion being provided with a belt-pulley *p* and a stop-block *p'*. The end of the winding-spindle P is slotted for the insertion of the pointed end of the mouthpiece-blank, the sleeve O' being also slotted to permit the blank to enter the bore. A bar O^2, arranged to slide longitudinally in a groove in the upper part of the standard O above the spindle P, carries a roller o^3 on its outer end in position to be operated by a cam-wheel O^3, so as to move in one direction, and a spring O^4, arranged as shown, slides it in the opposite direction. The inner end of the sliding bar O^2 has fastened to it an ejector O^5, which extends downwardly to the sleeve, where it is formed into a loop around the spindle and serves as a guide for the point of the entering blank. (See Fig. 45.)

As heretofore mentioned, the mouthpiece-blanks are cut from the web two at a time by the knives M^2 M^3. The front edge of the forward blank and the back edge of the rear blank are at an angle of forty-five degrees to the side edges, these angular edges having been cut by the knife M^2; but the adjacent edges of the blanks are perpendicular to the side edges. The forward blank will therefore present a pointed end to the winding-spindle P, into the slot $p^\times$, Fig. 45, of which the pointed end of the web *i* was inserted by the feed-rolls I' I^2 before the blanks were cut. The rotation of the spindle P winds the blank into tubular form within the sleeve O', after which it is ready for insertion into the cigarette-tube. It has been found that if the winding-spindle P, which has intermittent rotation, is started suddenly there is great danger of tearing off the point of the blank which lies in the slot $p^\times$. To overcome this difficulty, I have devised the following mechanism, (illustrated in Figs. 4 and 45,) by which the spindle, preferably rotated slowly at first, is gradually increased in speed: On the shaft 5 is secured a sprocket-wheel 21, which by means of a chain 24 drives a similar wheel 22, attached to a shaft 23. The shaft 23 has a crank 25 on its end, to which is connected a rack-bar 26, extending downwardly and having gear-teeth at its lower end meshing with a pinion 27 on the shaft 20. The lower end of the rack-bar 26 passes through and is supported by a guide 28, having a hub 29, in which the shaft 20 rotates. A grooved pulley 30, mounted loosely on the shaft 20, drives the pulley *p* by means of a belt p^3. Teeth on the hub of the pulley 30 are engaged by teeth on the pinion 27, the parts being kept closed by a spiral spring 32, the whole forming a clutch. By this arrangement as the crank 25 rotates the rack-bar is reciprocated, revolving the pinion 27, and through the various connections the spindle P at each downward movement is given revolution.

On the shaft 7 next the cam-disk M^5 is a cam M^6, rotating with the shaft. Beneath the cam is pivoted a lever M^7, operated by the cam M^6 to release a finger M^8 from engagement with the stop-block *p'* on the spindle P. A spring O^6, attached to one of the bearings *o*, extends downwardly and presses against a hook o^4 on the hub of the lever M^7 to return the finger M^8 to position for holding the stop-block *p'* so that the spindle P shall always be brought to rest in the same position. The parts are so timed that the finger M^8 is disengaged by the cam M^7 from the stop-block *p'* as soon as the pointed end of the mouthpiece-blank has entered the slot $p^\times$ of the spindle and just before the crank 25 begins its downward movement, which movement, it will be remembered, rotates the spindle. The rotary movement of the spindle will be slow at first, thus avoiding the danger of tearing off the point of the mouthpiece-blank; but it will gradually increase as the crank revolves. As soon as the blank has been completely rolled the lever M^7 will be disengaged by the cam and the spring O^6 raise the finger M^8, thus stopping the rotation of the spindle. Should the rack-bar 26 not have completed its downward movement, the belt p^3 would simply slip over the pulley.

The rear blank, as stated, has its pointed end projecting backwardly; but before it can be presented to the winding-spindle P it must be reversed, so that the pointed end shall be given forward direction. This reversing movement is accomplished by the rotation of the pin j^4, which is turned by the gear-wheels J^4 and J^5 and the rack J^7. At the proper time the rack J^7 is caused to move to the right, this movement rotating the gears J^4 J^5, and through the ratchet J^6 and pawl j^5 the pin j^4 will be given a semirotation. The blank being held between this pin j^4 and the button L^2 will partake of this semirota-

tion, as shown in Fig. 16, and be carried into position ready to be acted upon by the secondary feeding mechanism N.

The shaft 7 is journaled in bearings *o*, projecting from the side of a standard O. The outer end of this shaft has fixed thereon a gear-wheel 7^a. Also secured to this shaft are the cam-wheel M^5 and a secondary feeding device N for the reversed mouthpiece-blank. This feeding device consists of a head N′, to the face of which is pivoted a finger *n*, having a projection *n′* extending therefrom at a right angle, the lower end of the projection having a footpiece n^2, provided with a rubber or other yielding cushion n^3. The free end of the finger *n* is tapped for an adjusting-screw n^4, which passes through said finger and bears upon a stud n^5, projecting from the face of the head. A spring n^6, bearing on the finger *n*, tends to keep the screw n^4 always in contact with the projection n^5.

The feeding device N, which acts only on the reversed blanks, makes but one revolution for every two rotations of the winding-spindle. By this arrangement the footpiece n^2 will be above the axis of the shaft 7 and out of the way when the web *i* is fed forward and brought into position to engage the reversed blank as soon as it has been completely turned end for end. The contour of the cam M^6, mounted on and rotating with the shaft 7, is such that it operates the lever M^7 at each semirotation.

A tubular support Q′, Figs. 1, 5, and 19, is secured on the bearing Q of the shaft B, the axis of said support being in line with the axis of the winding-spindle P. A cylindrical slide Q^2 is placed within one end of the tubular support Q′ and arranged to move both longitudinally and circumferentially therein. A second cylindrical slide Q^3, having a longitudinal movement only, is placed in the opposite end of the tubular support. A spindle Q^4 passes longitudinally through the two slides and is adapted to rotate freely therein by means of a belt-pulley *q*, fastened to the spindle between the slides. The slide Q^3 is prevented from moving longitudinally on the spindle by the hub of the pulley *q* and a collar *q′*. The slide Q^2 is held on the spindle Q^4 by means of a sleeve q^3, fixed at its outer end to the sleeve and bearing at its inner end against a collar q^2 on the spindle, which collar abuts against the body of the slide Q^2. A collar Q^5 within the tubular support has two fingers q^4 formed thereon, which reach into longitudinal slots q^5, formed in the slide Q^2 and serve to guide said slide Q^2 in its longitudinal movement. A slot q^6 is made in the tubular support above the collar Q^5, which latter is provided with holes q^7 for the insertion of a pin for giving rotary adjustment to the slide Q^2.

The cylindrical slide Q^3 is provided with teeth on one side, which mesh with those of a pinion Q^6, rotating on a vertical pivot Q^7. A segmental rack Q^9 on the end of an arm projecting from a sleeve Q^{10}, pivoted to the bed-plate 1, rotates the pinion Q^6. An arm Q^{11}, projecting from the said sleeve, carries a roller $q^\times$, which bears on the periphery of a cam-disk Q^{12} on the vertical shaft 4. A spring q^8 maintains the roller in contact with the cam-disk. The spindle Q^4, which extends beyond the cylindrical slide Q^2, has a thimble Q^{13} on its outer end, the inner half of said thimble being corrugated and having a diameter substantially that of the inner diameter of the cigarette-tube. The outer portion of the thimble Q^{13} tapers to a smaller diameter. Surrounding the spindle Q^4 immediately back of the thimble Q^{13} is a sleeve q^8, slightly larger in diameter than the cigarette-tube. That part of the sleeve q^9 which projects into the cylinder Q^2 is enlarged and arranged to slide in a socket formed in the cylinder. The bore through the sleeve q^9 is sufficiently large to permit of the spindle passing therethrough without touching.

The rotary carrier G at each intermittent movement brings a cigarette-tube into the axial line of the two spindles P Q^4. The cigarette-tube having been so brought the spindle Q^4 will be moved toward the tube by the cam-disk Q^{12} actuating the segmental rack Q^9, pinion Q^6, and cylindrical slide Q^3. These movements will cause the tapered end of the thimble Q^{13} to enter the cigarette-tube until the sleeve q^9 strikes the end thereof, when the said sleeve will push the tube into the flaring end of the sleeve O′ and the enlarged bore o^2 until it strikes the end wall, when it will stop. Should the cigarette-tube be a fraction long, the sleeve q^9 will yield by compressing the spring q^{20}.

While the above operations are proceeding, the mouthpiece-blank has been wound upon the spindle P, as described, and is ready for insertion into the cigarette-tube. The bar O^2, carrying the ejector, is advanced by the cam-wheel O^3, acting on the roller o^3, which pushes the mouthpiece into the cigarette-tube and the latter out of the sleeve O′, so as to be free when the rotary carrier G is again moved. The ejector O^5 remains in its outermost position until the pointed end of another mouthpiece-blank has been directed into the slot $p^\times$ of the spindle P, as heretofore mentioned. The ejector then returns to normal position. During this pause of the ejector the spindle Q^4 has been withdrawn. To hold the cigarette-tube in position during the withdrawal of the spindle, a presser-bar J^8, having a head j^7 above the flanged disk G′ and a tail j^8, operated by a cam j^9 on the shaft 6, is pivoted to the table J. Just as the spindle Q^4 is about to be withdrawn from the cigarette-tube the presser-bar J^8 is depressed, and the head bearing on the cigarette-tube holds it in place while the spindle Q^4 is being withdrawn. To improve the appearance of the cigarette, it is desirable to place the mouthpiece in such position within the cigarette-tube that the square end of the paper on

the outer surface of the mouthpiece shall be hidden by the seam in the cigarette-tube. In the ordinary running of the machine this will not always occur, for experiment has shown that the paper of which the mouthpieces are made varies in thickness with different rolls, so that, owing to several causes, the square end of the blank will not uniformly be in the same relative position when placed in the cigarette-tube, as indicated in Fig. 26. This difficulty is overcome by the arrangement shown in Figs. 19, 20, and 22.

The spindle Q^4 is constantly turned by a belt q^{10}, running over the pulley q on the spindle and around a pulley q^{11} on a shaft 20. The thimble q^{13} on the end of the spindle also rotates with the spindle, carrying with it the cigarette-tube should there be one on the thimble. A small rod q^{12}, loosely pivoted in the cylindrical slide Q^2, parallel with the spindle Q^4, carries a hooked finger q^{13} on its outer end, the horizontal portion of the finger having a knife-edge on its inner side, Fig. 22, and bearing lightly against the cigarette-tube, a spring q^{30} keeping the hooked finger q^{13} in contact with the cigarette-tube. The cigarette-tube will thus be arrested in its rotary movement as soon the seam thereon engages the finger q^{13}. The point where the seam stops can be adjusted when found necessary to accommodate any change in position of the outer end of the wound mouthpiece by turning the collar q^5 through the medium of a pin placed in one of the holes q^7 in said collar. The web of wrapper-paper having been formed into a continuous tube and cut into cigarette lengths and blanks having been cut from a web of paper and one of them wound into a mouthpiece and inserted into a cigarette-tube the next step in the operation of making a finished cigarette is that of molding the filler and inserting it into the cigarette-tube at the end opposite to the mouthpiece.

At the rear of the machine in proper relation thereto is the tobacco-feeding device, which receives in bulk tobacco suitably prepared and distributes it in evenly-measured quantities to filler-forming devices, which deliver the formed filler to mechanism by which it is inserted into the cigarette-tube. The tobacco-feeding device will be briefly described, as, with a few exceptions, hereinafter pointed out, it is disclosed in the United States Patent No. 594,375, granted November 30, 1897, to James A. Bonsack and Hugo Bilgram.

In a hopper R, Fig. 27, made sufficiently large to hold the required amount of tobacco, are two cylinders R' R^2, the former being called the "feed-cylinder" and the latter the "filling-cylinder." These cylinders, which rotate in the same direction, but preferably at different speeds, are arranged so that their adjacent surfaces are near each other. The surface of the feed-cylinder R' is provided with teeth which incline toward the direction of rotation. The filling-cylinder R^2 may be simply roughened on the surface; but it is preferably covered with short teeth inclined in a direction opposite to that of rotation. The feed-cylinder R' revolves continuously; but the filling-cylinder R^2 has intermittent movement imparted to it by any suitable mechanism, preferably that shown in the patent referred to. The bottom of the hopper R consists of an apron R^3 of the width of the hopper, passing over rollers r r', the shaft of the roller r having a pulley R^4, which is driven by a belt r^2 from a pulley on the shaft of the feed-cylinder R'. The object of the movable apron or bottom R^3 is to keep the tobacco crowded against the toothed surface of the feed-cylinder R', so that the entire quantity shall be picked up by said cylinder and none left in corners. The feed-cylinder R' by its rotation picks up the surplusage of tobacco, part of which is pressed between the teeth covering its surface, while the excess is removed by the filling-cylinder R^2. By this means the feed-cylinder will be covered with a web of tobacco of even thickness and density and as wide as the cylinder is long.

R^5 is a stripper-roll having teeth on its surface, the rotation of which strips the tobacco from the feed-cylinder R' and showers it in an even and regular manner onto an intermittently-moving belt R^6, divided by vertical partitions r^3 into receptacles r^4 of equal size. Fingers R^7, which project downwardly from a rod r^5, extending across the hopper, press on the tobacco between the rows of teeth on the feed-cylinder and prevent its unequal removal by the stripper-roll.

To secure uniformity in the filler both as to amount and equal distribution throughout its length, it has been found advantageous to separate the tobacco as it is showered down from the feed-cylinder R' into equal quantities or parcels, each parcel being sufficient to form a filler and to separately deposit each parcel in the compressing mechanism. For this purpose the belt R^6, which is divided by partitions r^3 into equal receptacles, as described, is moved intermittently, so as to discharge in successive order the contents of the several receptacles, each separate discharge falling onto a vibrating door and being held for a moment thereon before being dropped to the compressing mechanism.

The device for moving the filler-carrying belt R^6 and vibrating the door R^{11} is shown in Figs. 1, 28, and 29. The belt R^6 passes around a roller r^6 on the shaft R^8, on which is fixed a cam-plate R^9, having three cam-surfaces r^7, as shown, for rocking a hooked arm R^{10} on one end of the shaft r^8 of the vibrating door R^{11}. A spring r^{12}, connected to a finger r^{13} on the opposite end of the shaft r^8, tends to keep the vibrating door in its open position. A disk R^{12}, mounted loosely on the shaft R^8, is secured by screws r^9 to the cam-plate R^9. The disk R^{12} has in its periphery three equidistant notches r^{11}, with which a pawl R^{13}, pivoted to a segmental rack

R^{14}, is adapted to engage. A straight rack R^{15} on the upper end of a rod R^{16} moves the segmental rack as the crank R^{17}, Fig. 4, on a shaft 33 rotates. The rack R^{14} through the engagement of its pawl R^{13} with a notch in the disk R^{12} moves the filler-carrying belt R^6. At the same time the cam-plate R^9 raises the curved arm R^{10} and swings the door R^{11} in the direction indicated by the arrow in Fig. 28, closing the entrance to the chute R^{18}. The vibrating door R^{11} remains closed until all the tobacco in one receptacle has been emptied thereon, when the curved arm R^{10} will slip into the depressed portion of the cam-plate R^9 under the influence of the spring r^{12}, and the vibrating door quickly uncovering the chute R^{18} the parcel of tobacco will fall in bulk into the chute and pass to the compressing mechanism. A handle r^{14}, pivoted to the filler-carrying-belt frame, has a lug r^{15}, which bears on the finger r^{13} when the handle is turned outwardly, as represented by dotted lines in Fig. 29, and closes the chute R^{18}, swinging inwardly the vibrating door R^{11}. This, if it is not desired to have the tobacco enter the compressing mechanism, will cause the tobacco to pass down the inclined trough r^{16} out from the machine.

The compressing mechanism consists of a bracket S, Figs. 27, 28, and 34, rigidly secured to the bed-plate 1, to which is pivoted a swinging lever S′, at the upper end of which is a curved plunger S^2, adapted to move back and forth within a hopper S^3, the width of which is substantially equal to the length of the cigarette-filler. The lever S′ is operated by a cam-wheel S^4, fastened to the end of the shaft 23, the cam-wheel working against a roller s on the lower end of the lever S′. An elevating-plunger S^5 moves in a vertical direction within the hopper through an opening in the bottom of the hopper, against the front wall s' thereof. The plunger S^5 receives its vertical motion from the cam-wheel S^4, a groove of suitable shape being formed in the side thereof, within which a roller s^2 on the lower end of the plunger works. The tobacco, falling through the chute R^{18}, enters the hopper S, after which the curved plunger S^2 by swinging forward compresses the tobacco between its front face and the front wall s' of the hopper until the space occupied by the tobacco is equal in width to the thickness of the vertically-moving plunger S^5, which at this time is in its lowest position or with its top even with the floor of the hopper. The plunger S^5 now rises and forces the tobacco into the open filler-forming mold placed just above it and remains elevated until the mold closes, when it descends ready for another charge. After the tobacco has been placed within the mold the curved plunger S^2 returns to its retracted position. The mold consists of a fixed section T, Fig. 28, and a movable section T′, adapted to be opened to receive the charge of tobacco for the filler, then closed and held closed for a certain time to give a "set" to the tobacco, and finally opened to discharge the formed filler therefrom and be wiped out to free its surfaces from all adhering particles.

The principal feature of the molding mechanism used in connection with this machine and illustrated in the drawings is that shown in the patent to Hugo Bilgram, dated August 11, 1896, and numbered 565,852. As shown in Figs. 1, 2, 27, 28, 30, and 34, an upright shaft 34, turning in a long sleeve-bearing $34^\times$, bolted to the rear of the bed-plate 1, carries at its upper end a horizontal table T^2, to which is pivoted a pawl t. On the lower end of the shaft 34 is a lever 35, attached thereto, by which the shaft is given an oscillating movement through the instrumentality of a connecting-bar 36, pivoted to a crank-disk on the shaft 4, the latter being rotated by a miter-gear 38, meshing with a similar gear 39 on the end of shaft 5, Fig. 4. Resting on the table T^2 is a circular plate T^3, concentric with the shaft 34 and having ratchet-teeth T^4 depending from its under surface in position to be engaged by the pawl t. A second pawl t', pivoted to a bracket on the bed-plate 1, engages the teeth and holds the plate T^3 fixed when the table moves backward. Above the plate T^3 and secured to it is a circular mold-plate T^5, through whose hub passes the shaft 34, around which the mold-plate T^5 turns. Above this mold-plate is the cam-plate T^6, pinned to the shaft 34, its under face being in close proximity to the upper face of the mold-plate and its periphery shaped to serve as a working cam for operating the movable mold-sections T′. The under surface of the mold-plate T^5 is provided with radial grooves t^2, within which are placed the fixed and movable mold-sections T T′, the former sections being secured in the peripheral ends of the grooves, Fig. 28. The mold-plate may be grooved for any convenient number of molds, twelve being shown in the drawings. Through the mold-plate, above each groove, is made a radial slot t^3, within which a roller T^7, having its pivot fixed to the movable mold-section, is adapted to slide. Screwed to the top of the cam-plate T^6 is an arm T^8, extending radially therefrom over the rollers T^7, which arm, curving downwardly, has attached to its curved end a block t^4. The periphery of the cam-plate T^6 acts on the rollers T^7 for the purpose of closing the molds. The mold-plate and molds project beyond the periphery of the circular plate T^3 and extend over the hopper S^3 of the compressing mechanism. (See Fig. 28.) Pivoted to the cam-plate at t^5 and passing under the arm T^8 is a finger T^9, on the movable end of which is a cam-surface t^6, adapted at the proper time and as hereinafter described to act on the rollers T^7 and close the molds. A radial socket t^7 is formed in a lug on the top of the cam-plate T^6, within which socket is placed a spring t^8, surrounding a pin t^9 and bearing against a collar thereon. The head of the pin is circular and rests in a cup-

shaped cavity in the finger T^9 in the rear of the cam-surface t^6. The outward movement of the finger, under the influence of the spring, is stopped by the arm T^8, against which it bears. When through the rotation of the crank on the shaft 4 the shaft 34 is caused to turn in the direction indicated by the arrow, Fig. 1, all the parts thereon will move with it, because the pawl t engages one of the ratchet-teeth T^4. The shaft 34 is turned at each forward movement sufficiently to advance the mold-plate the distance intervening between the molds—that is to say, one-twelfth of a revolution. The shaft then returns, and with it the table T^2 and the cam-plate T^6. The circular plate T^3 and the mold-plate T^5 are held stationary by the retaining-pawl t'. The mold-plate T^5 comes to rest immediately over the hopper of the compressing mechanism just at the time that the curved plunger S^2 has finished its advance movement and before the lifting-plunger S^5 has begun to rise. As soon as the mold-plate comes to rest the lifting-plunger rises and pushes the charge of tobacco into the mold, which has been opened in a manner to be hereinafter described. By this time the cam-plate T^6 is returning, and the cam portion of its periphery acting on the roller T^7 of the filled mold the mold will be closed. Previous to the closing of the mold or the filling of it, however, the horn t^{10} on the block t^4 has passed the roller T^7, the purpose of the horn being to insure the opening of the mold to its fullest extent. The mold-plate, continuing its backward movement, next brings the cam-surface t^6 on the finger T^9 against the roller T^7 of the mold next behind the one just filled and closes it on the wiping or cleaning head, hereinafter explained. At the conclusion of the cleaning action the horn t^{10} of the block t^4 strikes the roller of the mold just wiped out and opens the mold preparatory to receiving a charge of tobacco, after which the parts are again advanced to bring another mold in position to be filled. The rollers T^7 bear against the concentric portion of the periphery of the cam-plate T^6 and maintain the filled molds in closed position. The intermittent movement of the mold-plate finally brings each filled mold, one at a time, into position above the cigarette-tube-filling mechanism. (Shown particularly in Figs. 1, 2, 30, 31, 32, and 33.) This mechanism comprises a block U, supported on a standard U', bolted to the bed-plate 1 beneath the mold-plate T^5 in the relation shown in Fig. 2. The block U has a longitudinal opening u at one end, having a diameter substantially equal to that of the filler, which is slightly less than that of the cigarette-tube. The opening u communicates with a trough-shaped depression u' in the other end of the block U immediately beneath that part of the mold containing the filler. The outer end of the opening u is slightly enlarged and flared for the reception of the end of the cigarette-tube.

To the right of the block U and in the same plane therewith is a slide U^2, supported in a suitable guide U^3. On the inner side of the slide U^2 are teeth u^2, which engage with a segmental rack U^4 on an arm U^5 of the three-armed lever K. A rod U^6 passes longitudinally through the slide U^2 in the axial line of the opening u, having at its inner end a head u^3 (adapted to strike the filler and push it into the cigarette-tube) and at its outer end an adjustable stop-nut u^4. A flat spring u^5, placed in a recess in the slide U^2, bears on the rod U^6 with slight friction and holds it in position.

Projecting rearwardly from the standard O is a support U^7, carrying a bar U^8, adapted to slide longitudinally therein in the axial line of the rod U^6. The inner end of the bar U^8 has a stud u^6 and an outwardly-projecting spring-finger u^7, the opposite end of the bar U^8 being threaded and fitted with an adjustable stop-nut u^8 and a thumb-nut u^9. A rod U^9, attached to a lug on the inner end of the slide U^2, extends in a horizontal direction, parallel with the rod U^6, through a hole in the spring-finger u^7 and the lug u^{10} on the support U^7. When the mold-plate T^5 pauses over the block U in its travel, the filled mold over the block is opened by means hereinafter described and the filler dropped into the trough-shaped depression u'. The slide U^2 is then advanced by the three-armed lever K, and the head u^3 of the rod U^6 pushes the filler through the opening u into a cigarette-tube which has in the meantime been brought into line with the opening u and the bar U^8 by the carrier G. At the time the cigarette-tube is brought into position the slide U^2 is receding, drawing the rod U^9 with it. As it nears its limit of movement the pin u^{11} strikes the finger u^7, sliding the bar u^8, and the stud u^6 of said bar, engaging the mouthpiece end of the cigarette-tube, moves said tube endwise into the enlarged portion of the opening u. The parts are so timed that as soon as the filler is in the cigarette-tube the end of the rod U^9 strikes the head of the thumb-nut u^9 and moves the bar U^8 backwardly, the cigarette at the same time being pushed by the rod U^6 out of the opening u until it is free of the block U. The rotary carrier G then moves a step, carrying the cigarette away from the filling mechanism and bringing a new cigarette-tube into position for filling. The slide U^2 receding, the pin u^{11} on the rod U^9 will when near the end of the backward movement strike the spring-finger u^7, as described, and push the cigarette-tube into the opening u, as before. If for any reason the filler becomes choked in the opening u, the rod U^6 will move in the slide U^2, thus preserving the machine from injury.

To insure the certain dropping of the filler when the mold opens, a series of horizontal pins t^{11} are fixed to the mold-plate T^5 and project through openings in the movable section T' when it is retracted. (See Fig. 30.) A second series of horizontal pins t^{12}, projecting

from a head t^{13}, pass through openings in the fixed mold-section T and push against the filler when the mold opens. The head t^{13} is attached to the upper end of one arm of a bell-crank lever t^{14}, pivoted to a fixed support and rocked by means of a cam-wheel T^{10}, Fig. 28, acting on a roller t^{15} on the other arm of the bell-crank. Pivoted to the head t^{13} is a pawl T^{11}, which at the forward movement of the head t^{13} pushes against the roller T^7 on the movable mold-section T' and opens the mold, the cut-away portion of the cam-plate T^6 being at the time opposite the roller. Above the mold-plate is supported a third set of pins t^{16}, which move in a vertical direction downwardly through holes t^{17} into the mold. The pins t^{16} are grouped in two sets, one over each end of the mold. Each set is fastened to a disk t^{18}, arranged to move upwardly within a tube t^{19} against the pressure of a spiral spring t^{20}. The tubes t^{19} are fastened to a plate T^{12}, removably held in place by a pin t^{21} and a spring t^{22} on the end of an arm T^{13}, connected to a slide T^{14}, moving in the bracket S, which slide is raised by the periphery of the cam-wheel T^{10} acting on a roller t^{23}, pivoted to the lower end of the slide T^{14} and lowered by a spring T^{15}, as shown. The spiral springs t^{20} yield should the pins t^{16} meet with an obstruction.

V, Figs. 1, 34, and 35, is a bell-crank lever pivoted at v to the bed-plate 1. On one end of the lever is a roller v', engaging a cam-wheel V', by which it is given oscillation in a horizontal plane. The other end of the lever V carries a guide V^2, in which a slide V^3 is adapted to move vertically. To the lower end of the slide an upright spring-plate V^4 is secured, having a head v^2. A bracket, also secured to the lower end of the slide, extends downwardly and carries a roller v^3 and a roller v^4. A chain V^5, attached to the lower end of the slide, passes over a pulley v^5 to a pulley v^6, turning freely on the shaft v^7 of a roll V^6, the shaft being journaled in a yoke V^7, held by a bracket V^8, bolted to a leg 2. A ratchet-and-pawl mechanism connects the pulley v^6 to the roll V^6. A wiper-belt V^9, of felt or other suitable material, passes over the head v^2 of the plate V^4, down and under the roller v^3 and the roller v^4, and thence around the roll V^6. A guide v^8 surrounds the wiper-belt just below the head to keep it in position thereon. An extension V^{10} from the upper part of the slide V^3 is supported between a rigid arm V^{11} and a spring-arm V^{12}, the former being above the extension V^{10} and the latter being below it. These arms are bolted to the elevating-plunger S^5. When this elevating-plunger is raised to fill a mold with tobacco, it raises the slide V^3 to the position shown in Fig. 35, which movement carries the wiper into the open mold next behind the one just filled by the elevating-plunger. The mold is then closed on the wiper by the cam-plate T^6, as hereinbefore described. Immediately thereafter the cam-wheel V', acting on the roller v', oscillates the bell-crank lever V, which gives the wiper a sidewise movement within the mold, cleaning it from end to end. The mold is then opened, and when the elevating-plunger S^5 descends after having filled a mold it carries the slide V^3 and its attached parts with it. This pulls the chain V^5, which being wound around the pulley v^6 and attached thereto turns the roll V^6, thereby pulling the wiper-belt V^9 over the head v^2 and presenting a clean surface for the next mold. A rotary brush V^{13}, supported in proximity to the wiper-belt and driven by any suitable source of power, cleans the wiper-belt of all adhering particles of tobacco or other foreign matter. The spring-arm V^{12} being below the extension V^{10}, the wiper is held against the upper part of the mold with spring-pressure. A spring v^{20}, attached at one end to the bed-plate and at the other to a cord v^{21}, wound around a pulley on the shaft v^7, turns the pawl backward and takes up the slack of the chain as the slide V^2 rises. The continued rotation of the carrier G will finally bring the cigarettes supported in the notches g^2 to the bottom of the carrier, at which point they will fall onto the delivering mechanism X. Curved guides G^6, secured to the bed-plate 1, (a guide partly surrounding the periphery of each of the disks G' G^2 of the carrier G,) keep the cigarettes in the notches of the disks until the discharge-point is reached.

The delivering mechanism X, as represented in Figs. 2, 28, 37, and 38, consists mainly of a rectangular frame, formed of two side bars X' X^2, serrated on their upper sides and connected below by cross-bars X^3 X^4. A downwardly-extending projection X^5 is formed on the under side of the bar X', which is bolted securely to a lug x on the long sleeve-bearing $34^\times$, Figs. 37 and 38. A hanger X^7 forms a bearing, in which a shaft X^8, Fig. 28, is rotated by means of a gear-wheel x', driven by a similar wheel x^2, keyed to the shaft 23. Within the rectangular frame of the delivering mechanism X is a frame Y, adapted to move in a curvilinear path by the rotation of the shaft X^8. The upper edge of each side of the movable frame Y is serrated in the same manner as the side bars X' X^2, while from the lower edge of the side nearest the side bar X' there depends a plate Y', having a hub Y^2, in which a pin x^3, projecting eccentrically from the shaft X^8, rotates. The depending plate Y' is arranged to slide vertically in a groove formed in a plate Y^3, having lugs which project from its side face and slide in grooves y, formed in the hanger X^7. By rotating the shaft in the proper direction the frame Y will be so actuated by the eccentrically-placed pin that it will advance the cigarette toward the delivery end, as will be readily understood. The roll X^9, which extends across and below the frame X, is adapted to rotate freely on a fixed shaft X^{10}, which also carries a loose sleeve x^4, having a ratchet-wheel x^5 in one end near the roll X^9, which

carries a pawl x^6 to engage the ratchet-wheel. A gear-wheel x^7 is rotated in opposite directions by the reciprocating movement of a rack-bar x^8, pivoted to the gear-wheel x', the rack-bar being held in engagement with the gear-wheel x^7 by a guide x^9. A segment X^{11} extends around a portion of the roll X^9, between which and the segment X^{11} each cigarette is carried when the roll is turned by the forward movement of the rack. As each cigarette passes between the roll X^9 and the segment X^{11} it is rolled in a direction opposite to that in which the mouthpiece was wound. The object of thus rotating the cigarette is to cause the end $26^{\times}$, Fig. 26, of the blank from which the mouthpiece was made to lie closely to the body of the mouthpiece and not project tangentially therefrom, as shown. The cigarettes, after passing between the roll X^9 and the segment X^{11}, fall onto a chute X^{12} and roll onto a receptacle placed to receive them. The segment X^{11} is pivoted at x^{10}, so that it can be swung out of the way when desired.

It is desirable at the present day, and especially on this class of cigarettes, to have printed upon each one the name and address or trade-mark of the manufacturer, the name of the cigarette, or some distinguishing device. To accomplish this result, I have devised the mechanism shown in Figs. 46 and 47, which consists of a casing W, containing a printing apparatus and a bronzing device, said casing being secured to the bed-plate 1 by a bracket-arm W'. In the upper part of the casing, near one side, is fixed a fountain W^2, containing a sizing solution, if the printing is to be done in bronze, or ink, if colors are to be employed. The drawings show one apparatus for printing in bronze and another for color-work operating on the web at the same time, and, they being duplicates of each other, a description of one will answer for both.

On the end of an arm W^3 is a roller w, arranged to transfer size or ink from a roller w', running partly within the fountain W^2, to a larger roller W^4. Around the roller W^4 are smaller rollers w^2 w^3, the former serving to equally distribute the size over the face of the large roller W^4, while the latter rollers, of which there are two, take the size from the large roller and deliver it to the type-roll W^5. Under the type-roll W^5 is the impression-roll W^6, around which passes the web a of wrapper-paper on its way to the tube-forming mechanism, it being guided to the impression-roll by idlers w^4 w^5, while an idler w^6 guides it to the impression-roll W^6 of the color-printing apparatus. Near the impression-roll W^6 of the bronzing device is a pulley W^7, fixed to a shaft W^8, journaled in the casing, over which passes a belt W^9, of textile or other material, to which bronze-powder will adhere. The lower end of the belt W^9 passes around a pin or roller w^7 on the end of a pivoted arm W^{10}. The bottom of the casing W, which is curved and forms a receptacle for the bronze-powder, contains a wheel W^{11}, adapted to rotate therein and be partly buried in the powder. Its periphery is milled, so that the powder will readily adhere thereto. A spring w^8, attached to the arm W^{10}, holds the belt W^9 at all times in contact with the periphery of the wheel W^{11}. A guide W^{12} on a shaft w^9 and adapted to swing to and fro carries the bronzing-belt W^9 against the printed portion of the web a as it passes around the impression-roll. A series of rotating brushes W^{13} are placed below the impression-roll W^6, two of which run in contact with the web, while the third brush, moving in contact with the two, serves to clean them. On the shaft 100 of the lower feed-roll A^2 is a gear-wheel 101, engaging a similar wheel 102, journaled to the back of the casing W, which in turn meshes with a gear-wheel 103 on the shaft 104 of the large ink-distributing roll W^4 of the color-printing apparatus. An intermediate gear-wheel 105 turns a gear-wheel 106 on the shaft 107 of the type-roll W^5 of the color-printing apparatus, it also revolving a gear-wheel 108 on a shaft 109. A belt-pulley 110 on the shaft 109 is connected by a belt 11 to a larger pulley 112, journaled at the bottom of the casing, and on the shaft of the latter pulley is a pinion 113 for driving a gear-wheel 114 on the shaft of the bronze-carrying wheel W^{11}. A pulley 114^a connects by a cross-belt 114^b with the pulley 114^c on the shaft W^8, the pulley W^7, which carries the bronzing-belt, the latter being thereby rotated. Driven by the gear-wheel 108 is a gear-wheel 115 on the shaft 116 of the impression-roll W^6 of the bronzing device. This wheel in turn drives the gear-wheel 117 on the shaft of the type-roll W^5, and the latter gear-wheel, through an intermediate one 118, turns the gear-wheel 119 on the shaft 120 of the size-distributing roll W^4. By this system of gearing the parts are so timed that the surface speed of the type and impression rolls will be the same as that of the feed-rolls A' A^2. The size and ink distributing rolls W^4 are given endwise movement for the better and more even distribution of the size or ink thereon by means of a cam 121 on the shaft of each roll, each of which cams rotates between two fixed pins or antifriction-rollers on a support 122, screwed to the casing. The shaft of the roll w' of the bronzing device carries a ratchet-wheel 123, fixed thereon, which is turned by a pawl pivoted to an arm 124, operated by means of two or more pins 125, projecting from the inner side of the gear-wheel 119. A similar arrangement is used for the color-printing apparatus, the pins 125 projecting from the gear-wheel 103. The arms 124 return by gravity after the pins have acted upon them. The pins 125 also operate a finger 126 on the shaft 127 of each vibrating arm W^3. Each finger 126 after having been acted on by a pin 125 is returned to normal position by a spring 128. On the shaft 129 of the type-roll of the bronzing device is placed a cam 130

for operating an arm 131 on the shaft of the bronzing-belt guide W^{12}. One end of a spring 128 is attached to the arm 131 and holds its end against the cam 130. A belt 132 extends from the pulley 69 on a shaft 68, Fig. 4, and passes around pulleys 133 on the shafts of the brushes W^{13} and rotates them. The web *a* enters the casing W and, passing around the impression-roll W^6, receives an imprint (in sizing solution) from the type-roll W^5 at each revolution thereof of the device which is to appear in bronze on the cigarette. When this impression comes opposite the bronzing-belt W^9, the guide W^{12} is moved by the cam 130 toward the impression-roll W^6, which brings the bronzing-belt W^9 against the web *a*, thereby transferring to it some of the bronze-powder. Passing thence to the rotating brushes W^{13} all excess of powder will be removed from the web, leaving only that which is held by the adhesive sizing. The web now passes to the color-printing apparatus for an impression in color or else direct to the feed-rolls.

Referring more particularly to Figs. 1, 2, 3, and 4, on the main driving-shaft 40 is carried a pulley 41, which by means of a belt 42 turns a pulley 43 on a shaft 44, running lengthwise of the machine beneath the bed-plate. A sprocket-wheel 45 on the shaft 44 drives by means of a chain 46 a sprocket-wheel 47 on a shaft 48, which shaft also carries a bevel-gear 49. A bevel-gear 50, rotated by the bevel-gear 49, is fixed to one end of the shaft 33, its opposite end carrying the crank R^{17}, which operates the rack-bar R^{16}. A pinion 51 on the shaft 44 gears with and rotates a wheel 52, mounted on the shaft 5, through which shaft 5 power is transmitted to all the moving parts of the machine, except the tobacco-feeding mechanism and the brush V^{13}. A clutch 53, operated by the lever 54, throws the gear-wheel 52 into and out of connection with the shaft 5. A gear-wheel 55 on the left-hand end of shaft 5 drives a similar wheel 56 on the shaft 6, on which shaft is a sprocket-wheel 57. A chain 58, Fig. 1, extends from the sprocket-wheel 57 to a like wheel 59 on the end of the shaft 60, on which is fixed the cam-wheel O^3. The shaft 20, which carries the loose grooved pulley 30 and the pinion 27, has also secured to it a belt-pulley 62, driven by the belt 63 from the pulley 61 on a shaft 61^a, carrying a gear-wheel 61^b, meshing with the gear 55. A grooved pulley q^{11} on the shaft 20 drives the pulley *q* on the spindle Q^4, Fig. 19, by means of the belt q^{10}. The end of the shaft 20 carries a miter-gear 66, meshing with a similar gear 67 on a shaft 68, to which is fixed the grooved pulley 69, around which the belt 132 from the brushes W^{13} passes, Figs. 46 and 47. A gear-wheel 70 on the shaft 60 engages with and revolves the gear-wheel 7^a on the shaft 7, Figs. 1, 2, and 3. The shaft 6, Fig. 1, rotates the shaft B′ through the medium of the bevel gear-wheels 71 and 72 and a clutch 73. A shaft 74, journaled on the bed-plate, receives motion from the shaft B′ through the bevel gear-wheels 75 76. A bevel-pinion 77 on the end of the shaft 74 drives a bevel-gear 78, mounted on the end of the shaft 100 of the larger feed-roll A^2. A crank 79, fixed on the shaft B′, permits the feed-belt A^3, the feed-rolls A′ A^2, and the printing mechanism to be operated without moving any other part, the clutch 73 yielding when the crank 79 is turned.

The operation of the machine is as follows: Assuming that the cigarettes are to be given some distinctive mark indicating origin, a web of paper *a* passes, Figs. 46 and 47, from a reel (not shown) to the impression-roll W^6 of the bronzing device, the type-wheel W^5 at each revolution printing with a sizing solution on the web at suitable distances apart the device which is to appear in bronze on the finished cigarette. After receiving the impression the web *a* by the rotation of the roll W^6 is carried past the bronzing-belt W^9, which is brought in contact with the printed portion of the web by the swinging guide W^{12}, which deposits on the web a quantity of bronze-powder. Before leaving the impression-roll the rotating brushes W^{13} clean from the web all superfluous bronze-powder. The web then goes to the printing apparatus, where the colored device is applied, passing thence between the feed-rolls A′ A^2 into the trough-shaped guide, which bends it into U form. The web *a* is formed into a tube around the mandrel E^2 as it passes through the tube-forming device E, it being drawn therethrough by the crimping-wheels 3 e^4. The wrapper-tube thus formed passes in a straight direction to the cutting mechanism F, which is reciprocated in a line parallel to the wrapper-tube by means of the eccentric F^2. The reciprocating movement of the cutting mechanism measures off and cuts from the tube sections of equal length, which are taken by the carrier G to the mouthpiece-inserting mechanism. Before the knife f^5, Figs. 1, 2, 5, and 44, cuts a section from the continuous tube the tube has entered the carrier G, being directed into suitable notches g^2 by the guide H and footpiece *h*, the latter pressing the tube to the bottom of two notches g^2, one in each disk G′ G^2. The carrier will then be rotated the distance between the centers of two notches of a disk and another cigarette-tube placed in the following notches of the two disks, and so on continuously. The web of paper *i*, Figs. 1, 2, 3, 16, 17, and 18, of suitable thickness and as wide as the length of the desired mouthpiece, is led over the curved guide I^3 to the feed-rolls I′ I^2. The circumference of the feed-rolls being equal to the length of two mouthpiece-blanks, but one revolution is made for two cigarette-tubes severed by the cutting mechanism. This interrupted or intermittent movement is caused by the mutilated gearing between the shaft 6 and the feed-roll I′, which latter is turned but once for two rotations of said shaft. Each

revolution of the feed-rolls I' I² causes the web *i* of mouthpiece-paper to be fed forward past the knives M² M³ and under the cover-plate L' until the pointed forward end of the said web *i* enters the slot $p^{\times}$ in the winding-spindle P. The knives M² M³ are at this time in their elevated position, having been raised by the cam M⁵, acting on the roller m^4 and lifting the knife-carrying lever M'. The cover-plate L' is also raised through the action of the cam L⁴ upon the curved arm L. When the feed-rolls have ceased moving, the cover-plate drops on the web of mouthpiece-paper and the knives fall by gravity and cut from said web two blanks, each having a pointed end, that of the front blank extending toward the winding-spindle P, which is then immediately rolled by the winding-spindle into tubular form within the sleeve O'. By this time a cigarette-tube has been brought axially, Fig. 19, in line with the winding-spindle P and the spindle Q⁴. This having occurred, the cam-wheel Q¹² moves the segmental rack Q⁹, attached thereto, to operate the pinion Q⁶. The pinion Q⁶ engaging the toothed cylindrical slide Q³ will cause the spindle Q⁴, which rotates continuously, and the cylindrical slide Q² to move in a horizontal direction and push the thimble Q¹³ into the cigarette-tube, which will turn with said thimble. The spindle Q⁴ will continue its longitudinal movement until the end of the sleeve q^9 strikes the end of the cigarette-tube and pushes it into the open end of the sleeve O'. The bar O² will then be moved by the cam-wheel O³ until the ejector O⁵, attached thereto, has pushed the mouthpiece into the cigarette-tube and the latter out of the sleeve O', when after a short dwell the bar O², by the force of the spring O⁴, will be returned to its position of rest. Before the bar O², carrying the ejector O⁵, returns to normal position the second blank will be fed to the winding-spindle P, there to be rolled into a mouthpiece. The position of the second blank is reversed by the pin j^4, which is given semirotation by the wheel J⁵ through the medium of the wheel J⁴, which gears with it, the latter wheel being rotated by the rack-bar J⁷, connected to the three-armed lever K. The semirotation of the pin j^4 places the blank, with its pointed end forward, in position to be pushed toward the winding-spindle P by the footpiece n^2 as the rotating head N' of the secondary feed mechanism brings said footpiece in contact with the blank. The pin j^4 and the button L², projecting a short distance beyond the table J and the cover-plate L', respectively, grasp the blank between their opposing faces, and as the remainder of the blank is free from the pressure of the cover-plate the rotation of the blank is freely effected. The cigarette-tube, Figs. 1, 30, 31, 32, and 33, after receiving its mouthpiece is presented by the carrier G in front of the filler-inserting mechanism, where the tobacco filler, molded to the proper length and diameter by the filler-forming devices hereinbefore described, is pushed endwise into the tube by the rod U⁶, carried in the slide U², the latter being operated by the segmental rack U⁴, mounted on the three-armed lever K. After having been filled the cigarette is dropped on the delivering mechanism X and carried thence by the moving frame Y, in the manner described, to the roll X⁹, between which and the segment X¹¹ it passes, and, falling on the chute X¹², is received by a suitable receptacle.

Having thus described my invention, what I claim is—

1. The combination of mechanism for forming a continuous tube from a web by lapping its edges so as to form a longitudinal seam, mechanism for severing the continuous tube into tubular sections of equal length, mechanism for cutting blanks from a continuous web of reinforcing material, mechanism for winding the blanks into tubular form, and mechanism for inserting a wound blank into one end of each of the tubular sections, substantially as set forth.

2. The combination of mechanism for forming a continuous tube from a web by lapping its edges so as to form a longitudinal seam, mechanism for severing the continuous tube into tubular sections of equal length, mechanism for severing blanks from a continuous web of reinforcing material, mechanism for winding the blanks into tubular form, mechanism for inserting a blank into one end of each tubular section, and means for regulating the longitudinal seam with respect to the position of the outer end of the wound blank, substantially as set forth.

3. The combination of mechanism for forming a continuous tube from a web by lapping its edges so as to form a longitudinal seam, mechanism for severing the continuous tube into tubular sections of equal length, mechanism for severing blanks from a continuous web of reinforcing material, mechanism for winding the blanks into tubular form, mechanism for inserting a blank into one end of each tubular section, mechanism for introducing filling material into the opposite end of the said section, and means for regulating the longitudinal seam with respect to the position of the outer end of the wound blank, substantially as set forth.

4. In a cigarette-machine, the combination of wrapper forming and seaming mechanism for making a continuous tube by folding into tubular form a web of wrapper material, a knife for severing the continuous tube into sections of equal length, a carrier for the severed sections, means for cutting blanks from a web of reinforcing material, a winding-spindle for rolling the blanks into tubular form, mechanism for inserting rolled blanks into the severed tubular sections, a filler-forming mechanism, and mechanism for inserting the fillers into the tubular sections, substantially as set forth.

5. In a cigarette-machine, the combination

of wrapper forming and seaming mechanism for making a continuous tube by folding into tubular form a web of wrapper material, a knife for severing the continuous tube into sections of equal length, a carrier for the severed sections, means for cutting blanks from a web of reinforcing material, a winding-spindle for rolling the blanks into tubular form, mechanism for inserting rolled blanks into the severed tubular sections, a tobacco-feed, a compressing device, a filler-forming mold, and mechanism for inserting the fillers into the tubular sections, substantially as set forth.

6. In a cigarette-machine, the combination of mechanism for making a continuous tube from a web of wrapper material, a traveling knife for severing the continuous tube into sections of equal length, a carrier for the severed tubular sections, knives for cutting blanks from a web, a spindle for rolling the blanks into tubular form, mechanism for inserting the rolled blanks into ends of the severed tubular sections, mechanism for inserting previously-prepared fillers into the opposite ends of said tubular sections, and a final shaping device, substantially as set forth.

7. The combination of a mandrel, and a folder having a cylindrical opening therethrough inclined downwardly at an angle to the axis of the mandrel, and having further a slot extending tangentially downwardly from the cylindrical opening to the under surface of the folder, substantially as set forth.

8. In combination with a winding-spindle, intermittently-driven rolls for feeding flexible material, such as paper, from a reeled web, a knife for severing from the paper, at an angle of preferably forty-five degrees, a direct and also a reversed blank, constituting a double blank, a second knife for dividing the double blank into two single blanks, means for rotating the reversed blank, means for feeding the reversed blank after rotation to the winding-spindle, and means for removing endwise from the winding-spindle each blank after being wound thereupon, substantially as set forth.

9. In a cigarette-machine, the combination of a continuous-tube-forming mechanism, mechanism for severing the continuous tube into cigarette lengths, a carrier for the cigarette-tubes, a winding-spindle, means for intermittently feeding a length of paper from a web to the winding-spindle, a knife for cutting, at an angle of preferably forty-five degrees, a double blank from the web, a second knife for dividing the double blank into two blanks, means for rotating one of the blanks, means for feeding the rotated blank to the winding-spindle, and means for removing from the spindle each wound blank, and inserting it into one end of a cigarette-tube, substantially as set forth.

10. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a table, cutting-blades thereon, knives set at an angle to each other and adapted to coact with the cutting-blades, a pin extending through the table, and means for rotating the pin, substantially as set forth.

11. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a table, cutting-blades secured thereon, knives having their cutting edges set at an angle to each other and adapted to coact with the cutting-blades, a cover-plate above the table, a pin extending through the table, a rotatable button in the cover-plate above the pin, and means for rotating the pin, substantially as set forth.

12. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a table, cutting-blades thereon, knives adapted to coact therewith, a cover-plate above the table, a pin extending through and above the table, a rotatable button in the cover-plate projecting below the bottom of the cover-plate, means for lowering the button into contact with the pin, and means for rotating the pin, substantially as set forth.

13. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a table, cutting-blades thereon, knives placed at an angle to each other and adapted to coact therewith, a cover-plate, a rotating pin extending through and above the table, a rotatable button in the cover-plate and projecting below it, means for raising and lowering the cover-plate, a secondary feeding device, and a winding-spindle, substantially as set forth.

14. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a winding-spindle having a stop, a rocking lever having a finger adapted to engage the stop on the winding-spindle, means for moving the lever into and out of engagement with the stop, and means for rotating the spindle, and varying its speed of rotation, whereby the spindle is caused to start to revolve slowly and gradually increase its speed, substantially as set forth.

15. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a constantly-revolving shaft, a crank thereon, a rack-bar connected to and operated by the crank, a clutch member oscillated by the rack-bar, a pulley carrying the second clutch member and adapted to be rotated in one direction, a winding-spindle, and means for rotating the spindle and varying its speed of rotation, whereby the spindle is caused to start to revolve slowly and gradually increase its speed, substantially as set forth.

16. In a mouthpiece-forming mechanism for cigarette-machines, the combination of a shaft, a crank thereon, a rack-bar connected to and operated by the crank, a clutch-member oscillated by the rack-bar, a pulley carrying the second clutch member and adapted to be rotated in one direction, a winding-spindle rotated by the pulley, a device for stopping the winding-spindle irrespective of the rotation of the pulley, and means for varying

the speed of rotation of the winding-spindle, whereby it is caused to start to revolve slowly and gradually increase its speed, substantially as set forth.

17. In a cigarette-machine, the combination of a cigarette-tube carrier, a sleeve on one side thereof, a mouthpiece-winding spindle within the sleeve, an ejector surrounding the winding-spindle, a revolving spindle on the opposite side of the tube-carrier, and means for moving the revolving spindle in the axial line of the sleeve and winding-spindle, whereby the end of the said revolving spindle is caused to enter one end of a cigarette-tube and push the other end of said tube into the mouth of the said sleeve, substantially as set forth.

18. In a cigarette-machine, the combination of a cigarette-tube carrier, a sleeve on one side thereof, a revolving spindle on its opposite side, a finger, and means for moving the revolving spindle longitudinally in the axial line of the sleeve, and into one end of a cigarette-tube, substantially as set forth.

19. In a cigarette-machine, the combination of a cigarette-tube carrier, a fixed sleeve on one side thereof, a spindle on the opposite side adapted to revolve and also to move longitudinally in the axial line of the fixed sleeve, a thimble on the end of the spindle, a second sleeve movable endwise on the said spindle, back of the thimble, and a finger q^{13}, substantially as set forth.

20. In a cigarette-machine, in combination with the tubular support Q, a cylindrical slide arranged to move therein, a longitudinally-movable spindle passing axially through and adapted to revolve within said slide, a collar having fingers fitting in slots or grooves in the slide, and means for moving the spindle and the slide endwise, substantially as set forth.

21. In a cigarette-machine, the combination of a tubular support, a cylindrical slide arranged to move therein, a revolving spindle passing axially through the slide, means for moving the spindle and slide endwise, a collar within the tubular support provided with fingers which fit in slots or grooves in the slide, the said collar having means whereby it may be rotated for the purpose of rotating the slide around the spindle, and a finger pivoted to the slide and rotatable with it, substantially as set forth.

22. In combination with a carrier for supporting cigarette-tubes, a rotating spindle adapted to be moved into one end of a cigarette-tube for rotating said tube, and means for engaging with the seam of the tube to stop rotation, substantially as set forth.

23. In a tobacco-feed mechanism for cigarette-machines, the combination of a hopper, a continuously-revolving feed-cylinder rotating within the hopper at one side, an intermittently-rotating filling-cylinder, and a hopper-bottom traveling toward the feed-cylinder, substantially as set forth.

24. In a tobacco-feed mechanism for cigarette-machines, the combination of a hopper, a continuously-rotating feed-cylinder, an intermittently-rotating filling-cylinder, the two cylinders rotating in the same direction but at different speeds, a traveling endless apron forming the bottom of the hopper, and means for driving the apron, substantially as set forth.

25. In a tobacco-feed mechanism for cigarette-machines, the combination of a hopper, a continuously-rotating feed-cylinder within the hopper, an intermittently-rotating filling-cylinder, a traveling endless apron forming the bottom of the hopper, rollers around which the apron runs, one roller being in proximity to the cylinder, and means for driving the roller, substantially as set forth.

26. In a cigarette-machine, the combination of a tobacco-feed belt having partitions attached thereto, a driving-roller around which the belt passes, a cam-plate and a ratchet-plate both fixed to the shaft of the driving-roller, a curved rack turning on the said shaft and having a pawl to engage the ratchet-plate, a vibrating door, an arm on the shaft of the vibrating door being adapted to be operated by the cam-plate, and means for oscillating the curved rack, substantially as set forth.

27. In cigarette-machine mechanism, the combination of an intermittently-moving roller and a segment, between which roller and segment the cigarette is rolled and the mouthpiece is finally shaped, means for delivering the cigarette to said roller and segment, a stationary delivering-frame, and a frame Y adapted to move in a circulatory path within said frame for moving the cigarettes away from the carrying mechanism, substantially as set forth.

28. In combination with a mold-carrying wheel, a series of fixed mold-sections secured thereon, a series of movable mold-sections sliding on said mold-carrying wheel, means for sliding a movable section in one direction to open the mold, a wiping mechanism adapted to be inserted in the opened mold, and a yielding cam arranged to close the movable section upon or against the wiper, substantially as set forth.

29. The combination, in a mold-wiping mechanism, of a plate having a head on one end and adapted to be advanced into a mold, a cleaning-belt arranged to pass over the head and around a roller, and means for rotating the roller and moving the cleaning-belt upon the withdrawal of the wiper from the mold, substantially as set forth.

30. The combination, in a mold-wiping mechanism, of a plate having on one end a head and adapted to be advanced into a mold, a cleaning-belt, means for moving the cleaning-belt upon the withdrawal of the wiper from the mold, and a brush for cleaning the belt, substantially as set forth.

31. The combination, in a mold-wiping mechanism, of a plate having on one end a

head and adapted to be advanced into a mold, a cleaning-belt adapted to pass over the head and around a roller, means for rotating the roller and moving the cleaning-belt upon the withdrawal of the wiper from the mold, and a brush for cleaning the belt, substantially as set forth.

32. The combination, in cigarette-making machinery, of a mold-wiping mechanism, a cleaning-belt, and means to advance a clean portion of the belt after each wiping operation, substantially as set forth.

33. The combination, in a mold-wiping mechanism, of a cleaning-belt adapted to pass over a suitable support, and means, operated by the movement of the brush-carrier, to advance a clean portion of the belt after each wiping operation, substantially as set forth.

34. In cigarette-making machinery, a mold-wiping mechanism, a cleaning-belt and means for giving the belt side movement in the mold for the purpose of cleaning the same, substantially as set forth.

35. In cigarette-making machinery, means for continuously making a tube, means for cutting said tube into lengths to be filled with tobacco, means for charging each individual tube with tobacco, and means for protecting the end of said individual tube from injury while being charged, substantially as set forth.

36. In cigarette-making machinery, a mold-wiping mechanism, a cleaning-belt, and means for moving the belt into the mold for the purpose of cleaning the same, substantially as set forth.

37. In cigarette-making machinery, means for continuously making a tube, means for cutting said tube into lengths to be filled with tobacco, means for charging the individual tube with tobacco, a support for the end of the individual tube having a hole of less diameter than that of said tube, the outer end of said hole, for a suitable distance, being of diameter substantially equal to that of the tube, and then flared, substantially as set forth.

38. In a cigarette-machine, the combination of feed-rolls, means for delivering a web of wrapper-paper to said rolls in a different plane from, or out of line with, the plane of contact between said rolls, whereby the web of wrapper-paper is carried and tensioned against one of said rolls before passing through the said feed-rolls, wrapper-forming devices, and crimping-wheels having a speed of rotation greater than that of the feed-rolls, substantially as set forth.

39. In a cigarette-machine, the combination of an ejector O^5 looped and slotted to form a guide for the point of the mouthpiece-blank as it is inserted into the winding-mandrel, a slotted sleeve O′, and a winding-spindle P, substantially as set forth.

40. In cigarette-making machinery, the combination of means for forming a wrapper-tube, a mouthpiece-inserting mechanism, devices for holding the wrapper-tube during the time the mouthpiece is being inserted, and a yielding pusher for preventing the crushing of the wrapper-tube, substantially as set forth.

In testimony whereof I hereunto set my hand and seal this 12th day of December, A. D. 1898.

JAMES A. BONSACK. [L. S.]

Witnesses:
HUGH M. STERLING,
GEORGE H. HOWARD.