No. 649,897. Patented May 22, 1900.

O. BERGSTRAESSER.

CIGARETTE MACHINE.

(No Model.) (Application filed July 18, 1898.)

5 Sheets—Sheet 1.

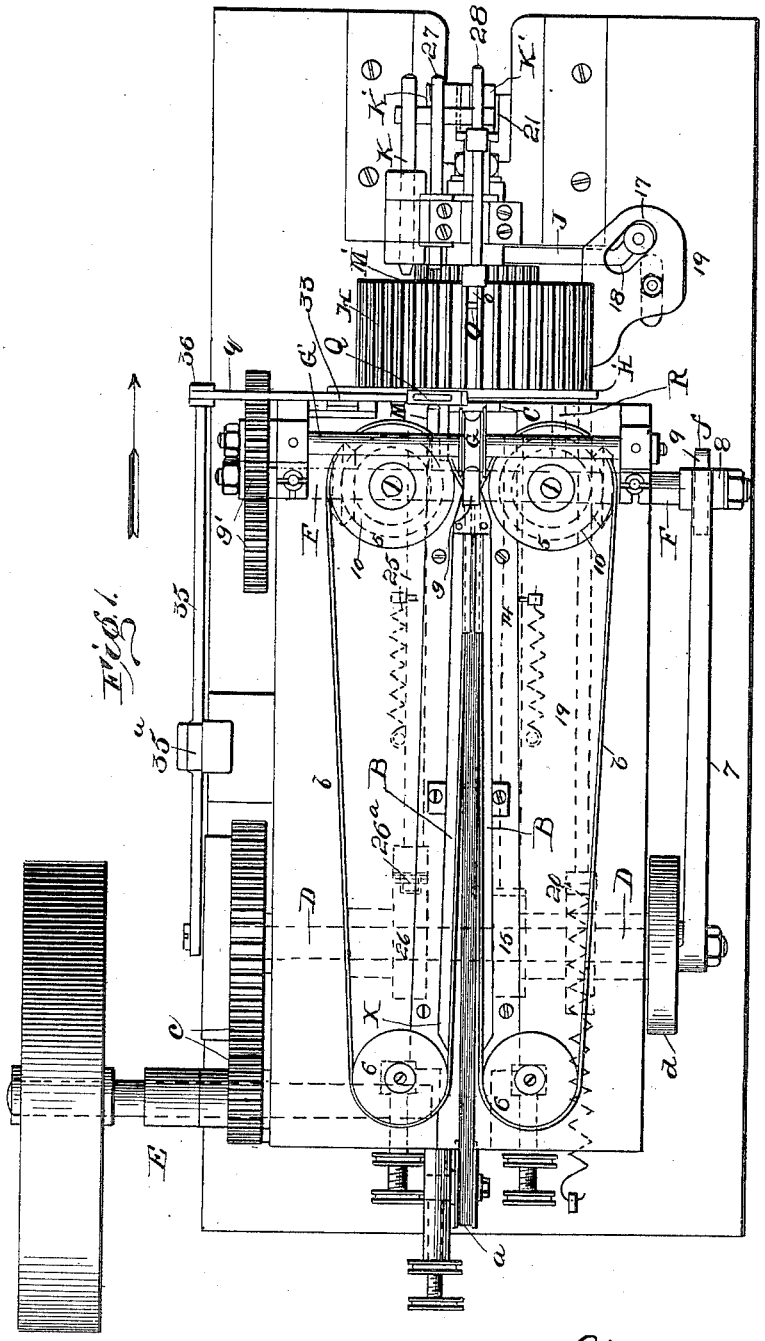

Fig. 1.

Witnesses
J. M. Fowler Jr.
Thomas Durant

Inventor
Otto Bergstraesser
by Church & Church
his Attorneys.

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(No Model.) 5 Sheets—Sheet 2.

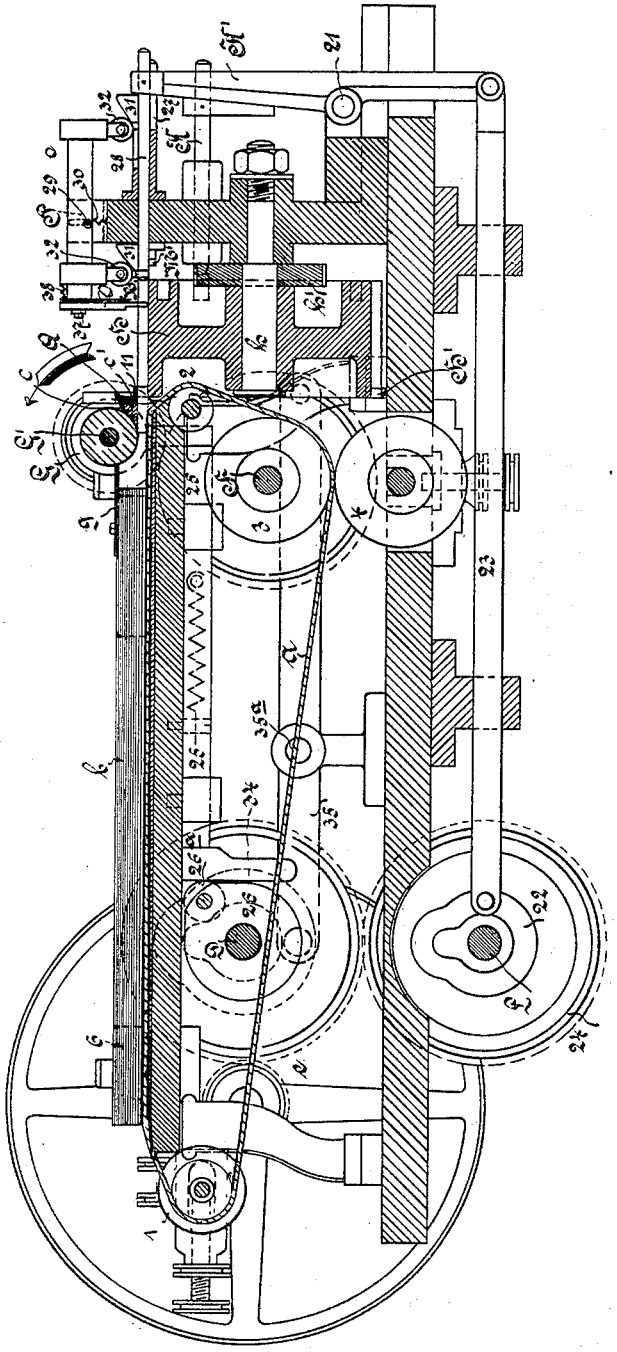

Fig. 2.

Witnesses:

Inventor:
Otto Bergstraesser
By Church & Church
Attys.

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(No Model.) 5 Sheets—Sheet 3.

Fig. 3.

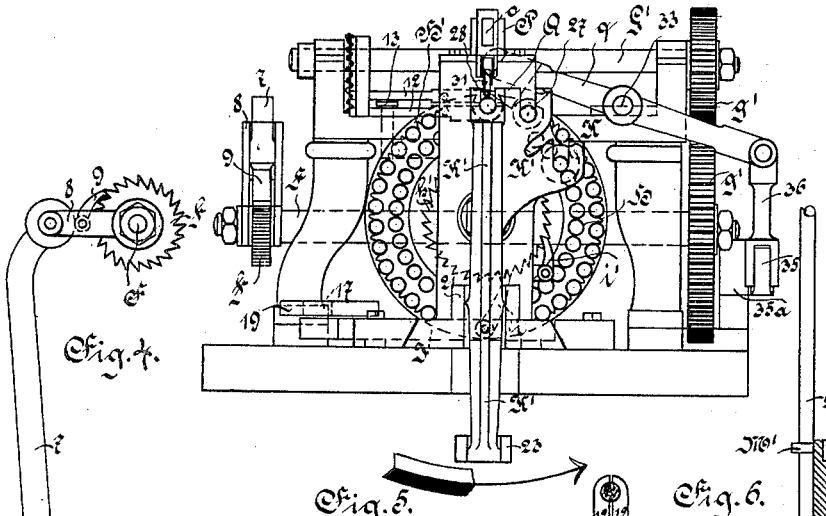


Fig. 4.

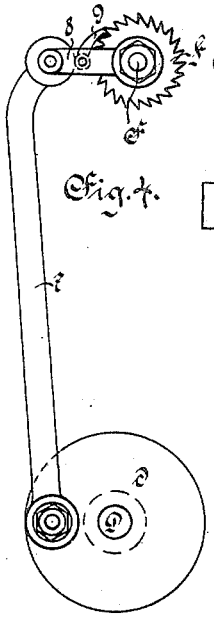


Fig. 5.

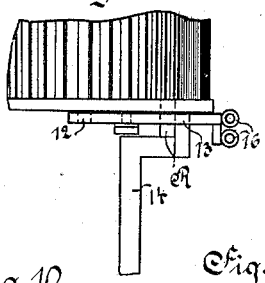


Fig. 6.

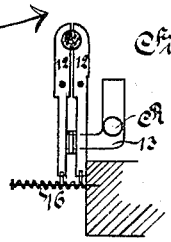


Fig. 7.

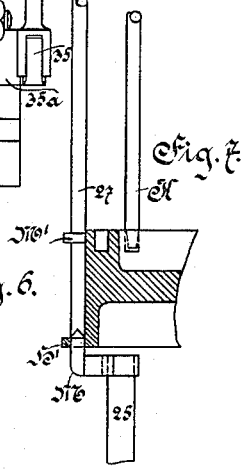


Fig. 10.

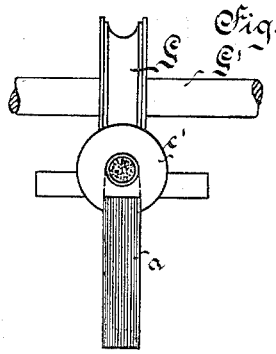


Fig. 8.

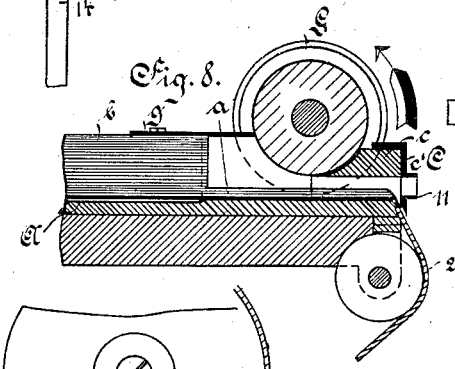


Fig. 11.

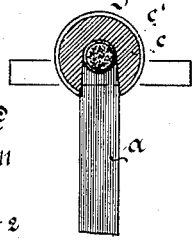
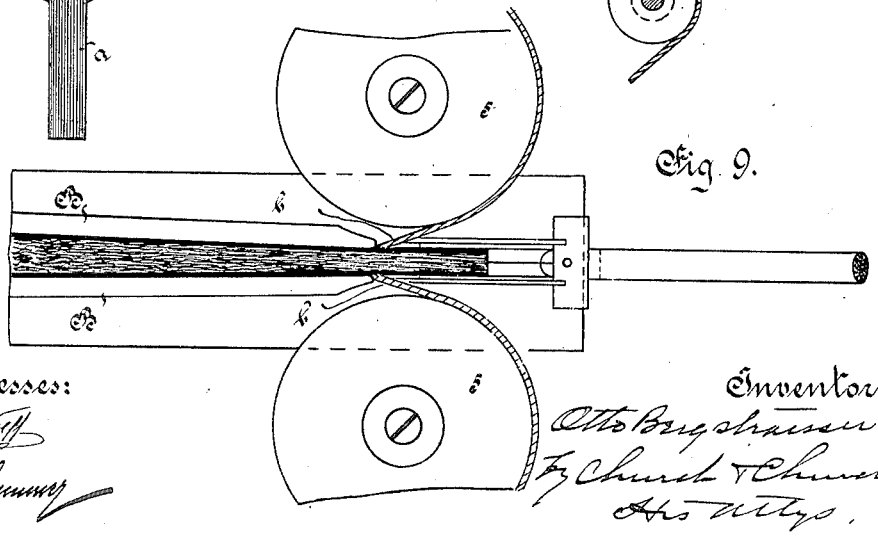


Fig. 9.



Witnesses:

Inventor:

Otto Bergstraesser

by Church & Church

Attys.

No. 649,897. Patented May 22, 1900.

O. BERGSTRAESSER.

CIGARETTE MACHINE.

(No Model.) (Application filed July 18, 1898.) 5 Sheets—Sheet 4.

Fig. 14.

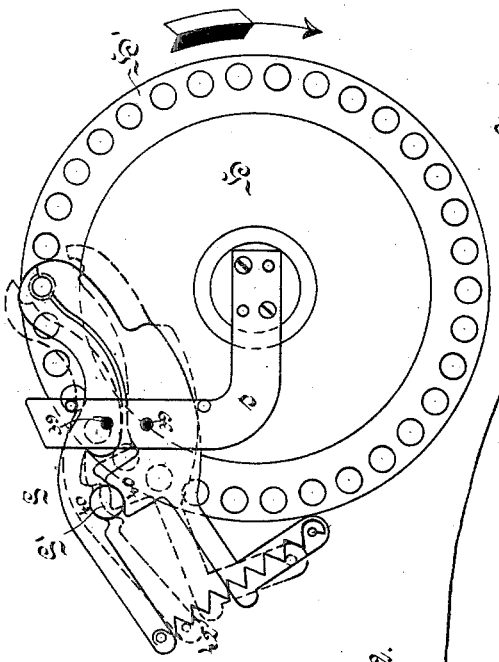


Fig. 13.

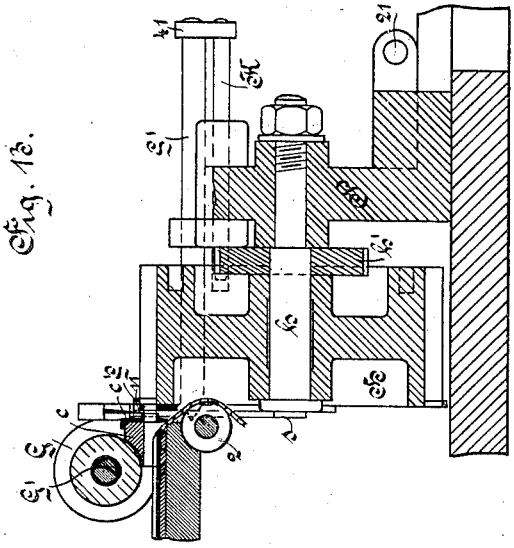
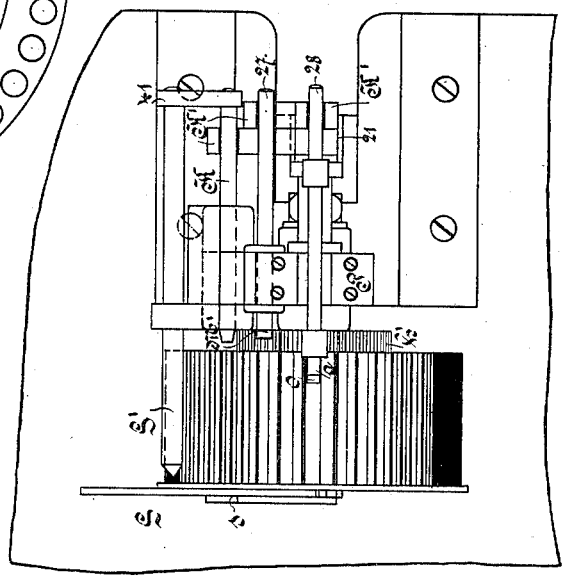


Fig. 12.



Witnesses:
Otto Wolf
Hugo Hammer

Inventor:
Otto Bergstraesser
by Church & Church
his attys

No. 649,897. Patented May 22, 1900.

O. BERGSTRAESSER.

CIGARETTE MACHINE.

(No Model.) (Application filed July 18, 1898.)

5 Sheets—Sheet 5.

Fig. 15.

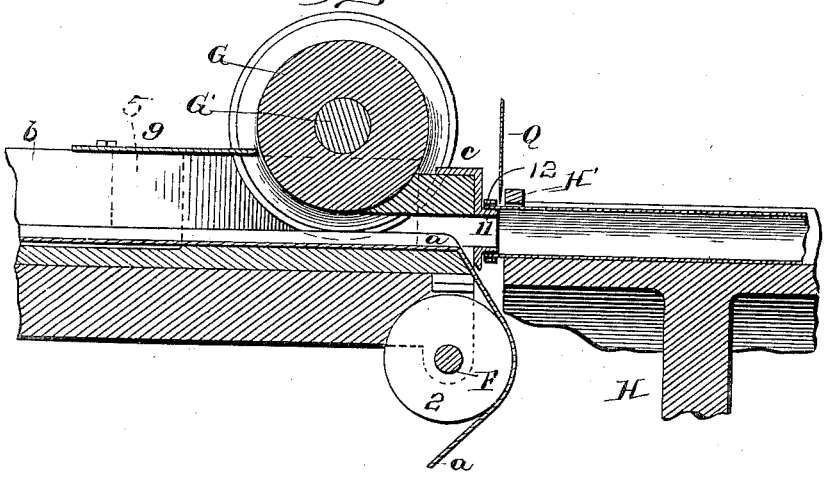


Fig. 16.

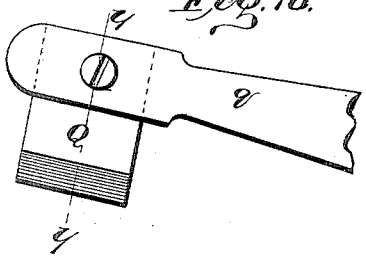


Fig. 16a

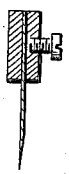
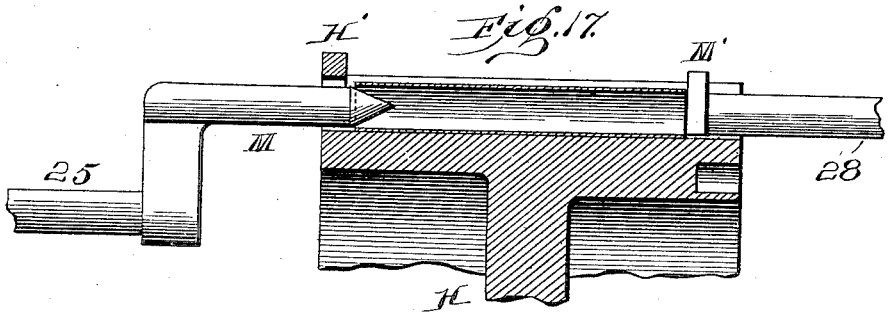


Fig. 17.



Witnesses
J. M. Fowler Jr.
V. B. Newton

Inventor
Otto Bergstraesser
By Church & Church
his Attorneys

UNITED STATES PATENT OFFICE.

OTTO BERGSTRAESSER, OF DRESDEN, GERMANY.

CIGARETTE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 649,897, dated May 22, 1900.

Application filed July 18, 1898. Serial No. 686,301. (No model.)

To all whom it may concern:

Be it known that I, OTTO BERGSTRAESSER, a subject of the Grand Duke of Hesse-Darmstadt, residing at Dresden, Germany, have invented certain new and useful Improvements in or Relating to Cigarette-Machines, (for which I have made application for patent in Great Britain, No. 14,446, dated June 30, 1898; in France July 4, 1898; in Italy July 4, 1898; in Hungary June 29, 1898; in Austria June 25, 1898; in Switzerland June 27, 1898, and in Germany May 26, 1898,) of which the following is a specification.

In the manufacture of cigarettes by hand a considerable quantity of short tobacco is produced by the necessary cutting off at both ends of the cigarettes. This represents a complete loss in the higher class of cigarettes, while in the lower class it is filled in together with the long tobacco. In pushing the tobacco-roll produced in a hinged tube into the paper tube by means of a ramrod the tobacco fibers are often injured, the tobacco is compressed in an irregular manner, (more at the rear end of the roll, where the ramrod engages with it, than at the front end,) and the fibers are distorted and broken. In the manufacture of cigarettes on the well-known machines (Bonsack and Elliot) there is, it is true, no short fibrous tobacco produced by cutting off the ends of the cigarettes; but these machines can work only with such short tobacco. Long fibrous tobacco cannot be used on them. The cigarette-making machine according to this invention is free from both the above faults. It can use long fibrous tobacco and does not injure its fibers in the working. At the same time there is no short fibrous waste produced. The cigarettes made by it are loose and airy, burn well, and are smoked very easily. This is effected by the tobacco rope being pushed with its suitably-cut end into a finished paper tube by means of intermittently-driven bands—consequently solely by the adhesion between the bands and the rope—up to its very end. Then the tobacco rope is cut close behind the paper, so that the tobacco only is cut, and the finished cigarette is separated from the tobacco rope the cut end of which forms the new front end for the next cigarette. This machine is illustrated in the accompanying drawings, in which—

Figure 1 is a plan; Fig. 2, a central longitudinal vertical section; Fig. 3, an end view looking from the right-hand side of the machine according to Figs. 1 and 2. The other figures are detail views, Fig. 4 being a ratchet-gear for the intermittent driving of the bands. Figs. 5 and 6 show means for fixing the paper tube in working position, which means will be hereinafter more fully described. Fig. 7 shows in section a part of the revolving head supporting the paper tube, the means for fixing the revolving head and for bringing up the next paper tube to be filled being also visible. Fig. 8 is a vertical longitudinal section; Fig. 9, a plan of the front end of the band-guide where the tobacco takes its final shape. Fig. 10 is an end view of Figs. 8 and 9. Fig. 11 is a cross-section through the mouthpiece of the band-guide, the descending band being represented in elevation. Figs. 12, 13, and 14 are respectively a plan, a vertical section, and an elevation of the revolving head, together with an auxiliary device for holding the cigarette, hereinafter fully described. Fig. 15 is an enlarged section showing the tubular spout, tongs or clamps, knife, and a part of the revolving head. Figs. 16 and 16^a are enlarged detail views of the cutter. Fig. 17 is an enlarged detail section showing part of the revolving head with the tubular wrapper in place and the expander in operative position.

The band-guide for feeding and shaping the tobacco rope and for introducing it into the paper tube consists of three endless bands, the bottom band *a* and two lateral bands *b*. The first band moves in a vertical plane, and the two others in horizontal planes over pulleys or disks, all the three bands traveling in a central longitudinal groove of the machine formed by the concave bottom A and the lateral walls B. The bottom band *a* comes from an adjustable pulley 1 into the groove and at once begins to assume arched shape in accordance with the shape of the bottom A. At the front end of the groove this band is guided downward through a mouthpiece C, hereinafter to be described, and over a guide-roller 2, Figs. 2 and 8. It then passes over

pulleys 3 and 4 and returns to the pulley 1. The two lateral bands *b* travel over pulleys 5 and rollers 6 in such manner as to fit the lateral walls B of the groove, from which they are guided out laterally behind the mouthpiece C, Figs. 1, 2, and 9. The rollers 6 are adjustable in order to enable the tension of the bands to be regulated. The three bands are intermittently driven in the direction indicated by the arrow, Fig. 1, in order to feed at each movement a portion of the tobacco rope of a length corresponding to that of the cigarette. This movement is transmitted from a shaft D, which is driven from the main driving-shaft E by means of a pair of toothed wheels *e*. A crank-disk *d* on the shaft D drives, by means of a connecting-rod 7, an arm 8, carrying the pawl 9, Figs. 1, 3, and 4. The arm 8 oscillates about the spindle F, the pawl intermittently engaging with a ratchet-wheel *f*, secured to this spindle. To the spindle F is also secured the driving-pulley 3, operating the bottom band *a*, Fig. 2. With said pulley 3 coöperates the adjustable counter-roller 4. The spindle F also drives, by means of bevel-wheels 10, Fig. 1, vertical spindles with pulleys 5 for driving the lateral bands.

Tobacco is placed by the attendant into the groove suitably distributed. It must be pointed out that there must be arranged above the machine a table (not shown in the drawings) consisting of two plates divided in the center by a slot, giving access to the groove. At the front end of the groove there is arranged the mouthpiece C, which completes the shaping of the tobacco rope and enables it to enter the paper tube. It also holds the paper tube fast while the rope is being introduced into it. The mouthpiece consists of a cylindrically-perforated hollow body *c* and a cap *c'*, (see chiefly Figs. 8 to 11,) put on from the front. The body *c* may be in one piece with the body of the groove. A pulley G coöperates with the mouthpiece for the purpose of shaping the tobacco rope. It is provided with a groove and fits the rear end of the mouthpiece C. The pulley G rotates in the direction of the arrow, Fig. 8, and compresses the tobacco rope fed by the three bands *a b b*, so that said rope enters the mouthpiece with a completely-circular cross-section. A sheet-metal tongue *g*, adapted to suit the cross-section of G, covers the groove from the place where the lateral bands come out and holds down the tobacco coming in, so that it may be properly seized by the pulley G. The pulley G is secured to the shaft G', which is driven from the shaft F by means of two toothed wheels *g'*, Figs. 1 and 3. The movements of the bands and of the pulley are therefore simultaneous and intermittent. The cap *c'* is provided with a very short tubular spout 11, which coöperates with a device, which will be now described, to hold fast the paper tube after it has been placed with its rear end on the spout 11 in the manner to be hereinafter described. The paper tube and the tubular spout are inclosed by the branches 12 of the tongs. (Visible in Fig. 3, but still better in Figs. 5 and 6.) The tongs are closed by a wedge 13 when the rod 14, carrying said wedge, is caused to advance by the cam 15 on the shaft D, Fig. 1, or held in the advanced position. As soon as the wedge is withdrawn the tongs are opened by the action of two springs 16, which engage with the rear ends of the arm of the tongs. One of these springs acts by compression and the other by tension. To bring empty paper tubes to support them during the introduction of the tobacco rope and to remove the finished cigarettes, there is provided in the machines constructed as illustrated a head H, revolving freely about the horizontal spindle *h* and provided at its periphery with a number of longitudinal groove-like cells. At the back end of the revolving head, nearest to the band-guide, there is a flange H', provided with cylindrical holes corresponding to the cells. The perforations register with the spout, and as the wrapper projects through the registering perforations it (the wrapper) is surrounded by a rigid wall to prevent its being burst open as the tobacco first enters it. To H there is secured a ratchet-wheel *h'*, Figs. 2 and 3, with which engages at the bottom a pawl *i*, Fig. 3, supported and moved by means of a slide J, rectilinearly guided transversely of the frame-plate. A roller 17 at the front end of J engages with an oblique slot 18 in the head of a rod 19, Fig. 1, which is moved in the longitudinal direction of the frame-plate by the cam 20 on the shaft D. The slot 18 transforms the longitudinal movement of the rod 19 into transverse movement of the slide J and the pawl *i*. A second pawl *i'* prevents the revolving head from rotating backward, said rotating head being from time to time caused to rotate forward to the extent of one cell. The exact setting and fixing of the revolving head in each of its positions is effected by a pin K, Figs. 1 to 3 and 7, which penetrates with its conical end into holes in the head H, provided there for the purpose. A double-armed lever K', pivoted about a pin 21 and having three branches formed in its upper arm, carries the pin K and is oscillated by a link or rod 23, having a projection working in the cam-groove 22, made in a pulley mounted on the shaft L and driven from the shaft D by means of the already-mentioned toothed wheel *e* and the toothed wheel 24 of the same size on the shaft L.

The head H rotates in the direction of the arrow at the bottom of Fig. 3. The paper tubes to be filled are introduced one by one in the cells of the ascending part of the revolving head either by hand or by any mechanical device, which need not be further considered here. The course of one paper tube will now be followed. The cell containing it comes first within reach of an advancing device. (Shown separately in Fig. 7.) It consists of a mandrel M with blunt tapering point, which when the revolving head is at

rest is pushed through the corresponding hole in H′, enters the back end of the paper tube, and forces it to assume a round shape in order to enable said tube to be pushed over the tubular branch 11. M is supported by a rod 25, Figs. 1 and 2, which is caused to advance by a cam 26 on the shaft D. The point at which the cam engages is provided with a friction-roller 26ª. The required abutment for the advancing device M is formed by the counter-holder M′, Figs. 1 and 7, connected by a rod 27 with one branch of the lever K′, Fig. 3. The lever K′ pushes the paper tube by means of the counter-holder up against the flange H′, whereupon the driver M advances. The paper tube in question prepared by the driver M arrives at the next partial rotation of the head H in front of the mouthpiece C and its spout 11. When the head stops, a slide N, Fig. 2, also carried by the lever K′ by means of a rod 28, advances and pushes the paper tube through the hole in H′ and onto the spout 11. At the next moment the wedge 13 advances and the tongs 12 12 are closed, the end of the paper tube being thus clamped to the spout 11. The slide N returns immediately afterward. The bands and the pulley G now begin to move. The tobacco rope is caused to advance and is pushed into the paper tube until it reaches the front end of said tube. At the moment, however, the paper tube must advance a little, together with the tobacco rope, so that the back end of said tube which was meanwhile released by the tongs may leave the spout 11, and the cut separating the finished cigarette from the rope may be effected immediately behind the paper tube, and therefore only through the tobacco. This additional advance is effected by the bands or the disk G. It is limited by a stop or finger O, vertically adjustable in a slot in the frame P, guided by a pin 29 in the frame P and always pulled downward by a spring 30, Fig. 2. During the advance of the rod 28 a bar *o* with the finger O has been raised, by the wedges 31 coming under the finger, out of the path of the advancing slide. During the return of the rod 28, however, the finger O descends into the cell. It leaves so much clearance to the cigarette advancing after the tongs 12 12 have been opened that the back end of the paper tube leaves the spout 11 and moves so far that there is room for the cutter between the tube and the spout. In this position the finger holds fast the cigarette, the bands now standing still. At the moment a cutter Q, Figs. 1 to 3, swings down between the spout 11 and the flange H′ close behind the back end of the paper tube and severs the cigarette from the rope by a clean cut, at the same time cutting into proper shape what is now the front end of the rope. The cutter is supported by a lever *q*, pivoted at 33, Figs. 1 and 3. This lever is actuated by means of a cam-groove 34 in a disk on the shaft D and by means of a lever 35, pivoted about 35ª, and a guide-rod 36. Another partial rotation of the head brings the finished cigarette to the descending part, where it advances step by step until it finally arrives within reach of the ejector R. This (together with the wedge 13 described for closing the tongs 12 12) has the form of a round pin and is secured to the rod 14. During a period of rest of the head the ejector R enters through H′ in order to release the back end of the cigarette from the flange H′. During further rotation of the revolving head the cigarette then falls out at once from its cell and rolls along an inclined plane (not shown in the drawings) toward a place where they are collected.

The finger O ascends and descends with the bar *o* whenever the latter is raised and lowered by means of the weights 31 and the rollers 32, Fig. 2. The turning of the drum H, however, only takes place when the finger O is at its lowest position. In this position the finger extends into the slot on the circumference of the drum H. Owing to such arrangement the drum H cannot turn unless the finger yields, and for this purpose the finger O is pivotally mounted on the pin 37 on the left end of the bar *o* in such a manner that it can yield when the drum is turned. The spring 38, acting on a pin at the back of the finger O, causes the finger to spring back into its vertical position after the wall of the recess *x* has passed underneath it. Thus the finger is moved by the walls of the recess and not by any special mechanism.

The tobacco rope coming out from the mouthpiece C or its spout 11 has of course the tendency to expand. In the construction of the machine hereinbefore described this tendency is counteracted and the paper tube supported from outside at its back end—*i. e.*, the end at which the tobacco enters by the holes in the flange H′ of the revolving head. In some cases, however, this expansion is so strong that the paper tube is pressed by its inner pressure hard against the walls of the hole, which sometimes interferes with the subsequent advance of the paper tube, together with the tobacco rope. If very soft paper be used for the tubes, they may even break. I will therefore now describe a device by means of which this drawback is obviated in a sure manner. This is effected by replacing the unalterable hole in the flange H′ as far as it has to support the paper tube by a hinged mold. This mold acts in the same way as the hole, but is opened by turning the two halves about the hinge-joint before the advance of the filled paper tube with the tobacco rope begins. Fig. 12 is a plan of the revolving head with this auxiliary device. Fig. 13 is a central vertical cross-section through the mouthpiece and revolving head; Fig. 14 an elevation of said head, with the auxiliary device seen from the inner end next to the mouthpiece, on a larger scale than the rest of the figures. The said hinged mold is constituted by a pair of tongs S, the double-

armed legs of which are pivoted at 39 39 to an angle-bracket *s*, secured to the inner end of the fixed spindle *h* of the revolving head. It will be seen from Fig. 13 that S is arranged between the mouthpiece C and the revolving head H, the flange H′ of which is here narrower than in the construction previously described. The holes in H′ are larger than before. The semicircular notches of the legs of the tongs form when closed a cylindrical opening or mold, the diameter of which corresponds to that of the paper tube and which is situated in the path of the tobacco rope coming out from the spout 11. On the other side of the center of rotation 39 the legs are provided with notched projections 40 40, between which there comes a pointed pin S′ for the purpose of closing the mouth of the tongs. S′ is rigidly connected with the already-described fixing-pin K by a transverse part 41. Therefore when the lever K′ oscillated it advances, together with the pin K. A spring 42, connecting the back ends of the legs of the tongs, opens the tongs as soon as S′ goes back. The tongs, which open before the finished cigarette is cut off, enable the end of the cigarette projecting from H′ to come out laterally of their mouth in the direction indicated by the arrow, Fig. 14, as shown by the dotted position of the tongs. This arrangement has also the economical advantage of not necessitating the replacing of the revolving head for manufacturing cigarettes of different thickness. Only the mouthpiece C and the pulley G and the tongs S must be exchanged, or if the mold be formed by separate jaws mounted on the tongs only these jaws must be exchanged. The tongs S may be also connected with the tongs 12 12 (inasmuch as they move in unison therewith) for holding the end of the paper tube fast on the branch 11.

Obviously other preferred or well-known devices may be substituted for the drum or head H without affecting the operation of the other parts of the apparatus, and hence I do not wish to be limited specifically to this feature.

What I claim is—

1. In a cigarette-machine, the combination of the following instrumentalities, to wit, mechanism for forming, compressing and intermittingly advancing a continuous filler of tobacco, a tubular spout through which the continuous filler is projected by the compressing and advancing mechanism and a holder for supporting a tube at the exit of the spout for the reception of the filler; substantially as described.

2. In a cigarette-machine, the combination of the following instrumentalities, to wit, mechanism for forming, compressing and advancing a continuous filler of tobacco, a tubular spout through which the continuous filler is projected by the compressing and advancing mechanism, an intermittingly-operating holder for supporting a tube at the exit of the spout for the reception of the filler and an intermittingly-operating knife operating across the mouth of the spout for severing the filler; substantially as described.

3. In a cigarette-machine, the combination of the following instrumentalities, to wit, intermittingly-operating belts forming between their proximate faces a channel for the reception and feed of a continuous filler of tobacco, a tubular spout located beyond the end of the channel and through which the continuous filler is projected by the belts, with means for supporting tubular cigarette-wrappers in position to receive the filler from the spout and a knife for severing the filler after its passage from the spout; substantially as described.

4. In a cigarette-machine, the combination of the following instrumentalities, to wit, intermittingly-operating converging belts forming between their proximate faces a converging channel for the reception and feed of a continuous filler of tobacco, a tubular spout through which the continuous filler advances and having an external diameter less than that of the completed cigarettes, and a clamping mechanism for holding a tubular wrapper on the spout while the filler is being injected therein; substantially as described.

5. In a cigarette-machine, the combination with three belts forming a channel for a continuous filler, guide for holding the belts in proper alinement, a grooved compressure-wheel overlying the lower belt at the forward end and mechanism for moving said belts and wheel intermittingly, of a tubular guide through which the continuous filler is projected by the belts and wheel, an intermittingly-operating holder for tubular cigarette-wrappers and an intermittingly-operating knife working across the mouth of the tubular guide; substantially as described.

6. In a cigarette-machine, the combination of the following instrumentalities, to wit, intermittingly-moving bands between which a continuous filler is compressed and advanced intermittingly, a tubular spout adapted for the reception of one end of a tubular wrapper and through which the filler is projected by the bands, a knife working across the end of the spout, clamps for holding the tubular wrapper on the spout and operating mechanism timed to release the clamps before the feed of the filler is arrested, whereby the wrapper is advanced beyond the end of the spout before the filler is severed; substantially as described.

7. In a cigarette-machine, the combination of the following elements, to wit, mechanism for forming, compressing and intermittingly advancing a continuous filler of tobacco, a tubular spout through which the continuous filler is projected and adapted to receive one end of a tubular wrapper, a knife working across the end of the spout, clamps for holding the tubular wrapper on the spout, operating mechanism timed to release the clamps

before the feed of the filler is arrested whereby the wrapper is carried off the spout and a stop for arresting the feed of the filler; substantially as described.

8. In a cigarette-machine, the combination with a filler forming and feeding mechanism, and a tubular spout through which the filler is projected by the feeding mechanism, of a rotary head moving transversely of the spout and having a series of wrapper-seats therein, a flange on said head having apertures corresponding to the seats and adapted to register with the spout and form an inclosure for the wrapper to prevent its being burst open as the tobacco enters and a pusher for advancing the wrappers through said apertures and around the spout; substantially as described.

9. In a cigarette-machine, the combination with a filler forming and feeding mechanism and a tubular spout through which the filler is projected by the feeding mechanism, of a rotary head moving transversely of the spout and having a series of wrapper-seats therein, a flange on said head having apertures corresponding to the seats and adapted to register with the spout and form an inclosure for the wrapper to prevent its being burst open as the tobacco enters, a pusher for advancing the wrappers through the apertures and around the spout and clamps for holding the wrapper in engagement with the spout while the filler is advanced; substantially as described.

In witness whereof I have hereto set my hand in the presence of the two subscribing witnesses.

OTTO BERGSTRAESSER.

Witnesses:
OTTO WOLFF,
HUGO DUMMER.