

No. 711,986.

Patented Oct. 28, 1902.

F. J. LUDINGTON.

CIGARETTE FORMING, WRAPPING, AND IRONING APPLIANCE.

(Application filed Dec. 4, 1901.)

(No Model.)

4 Sheets—Sheet 1.

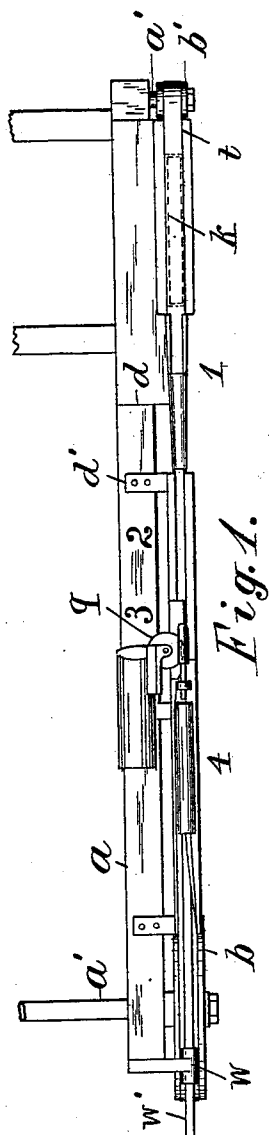


Fig. 1.

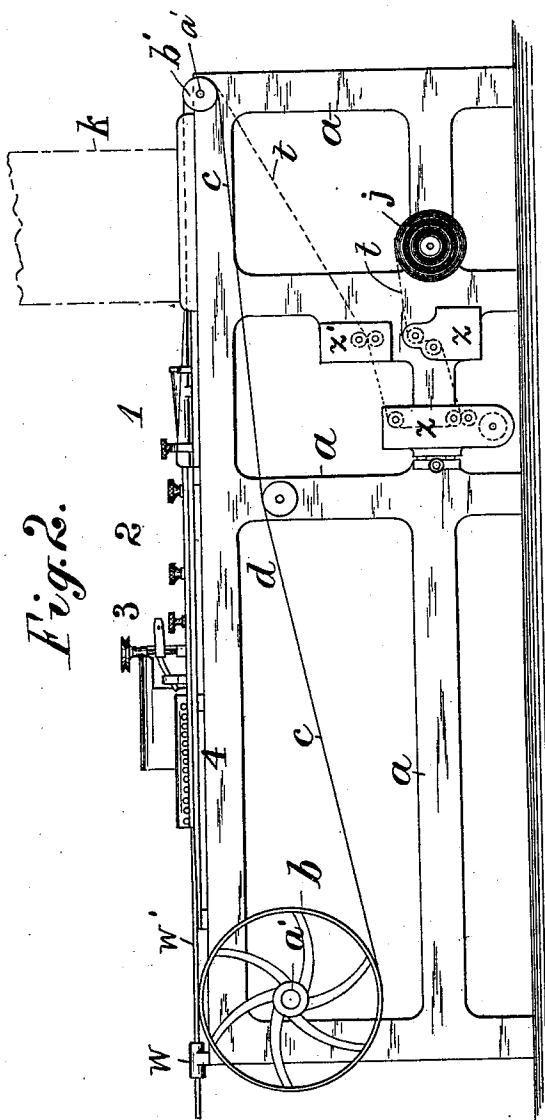


Fig. 2.

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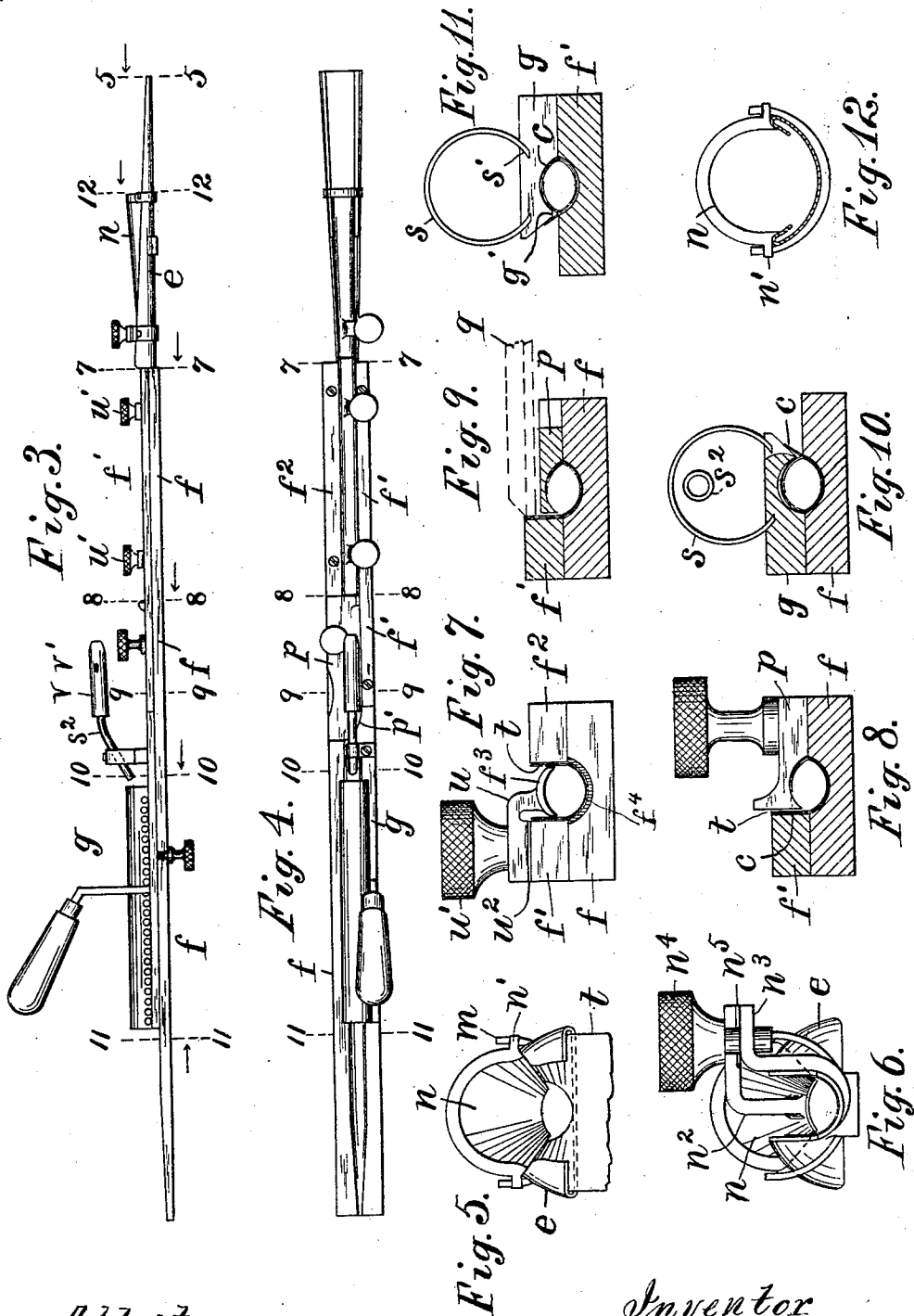
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4 Sheets—Sheet 2.



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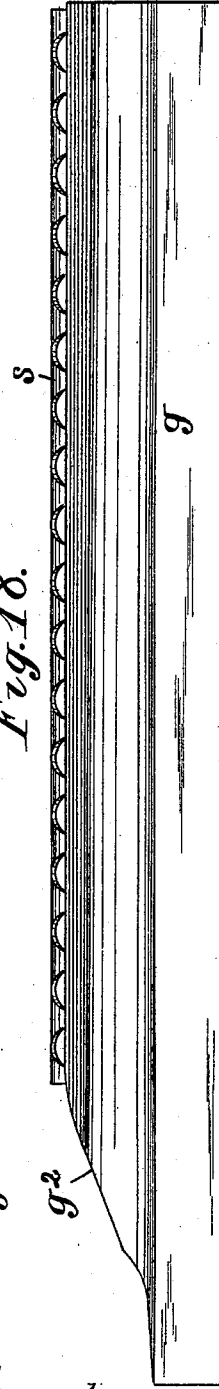
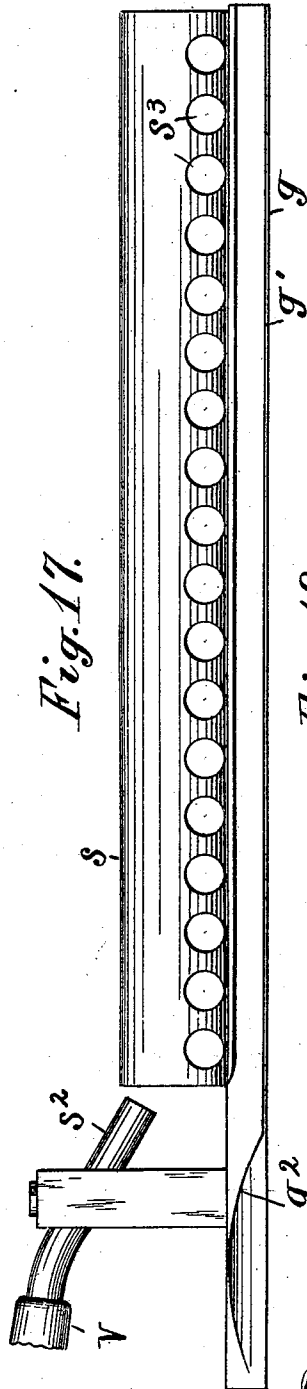
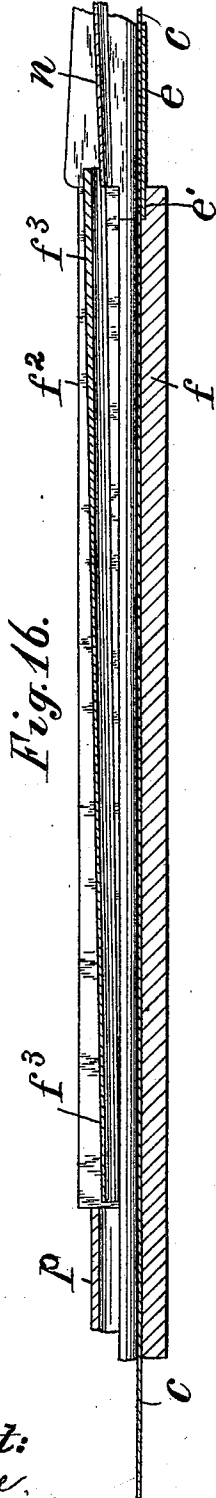
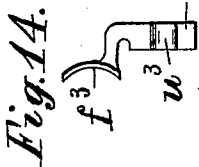
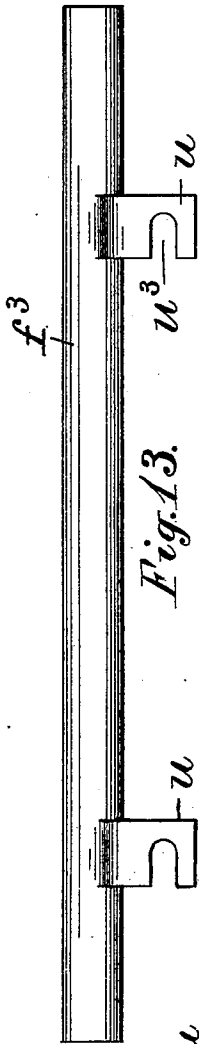
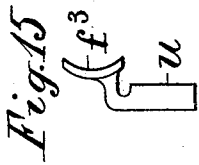
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(Application filed Dec. 4, 1901.)

4 Sheets—Sheet 3.

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4 Sheets—Sheet 4.

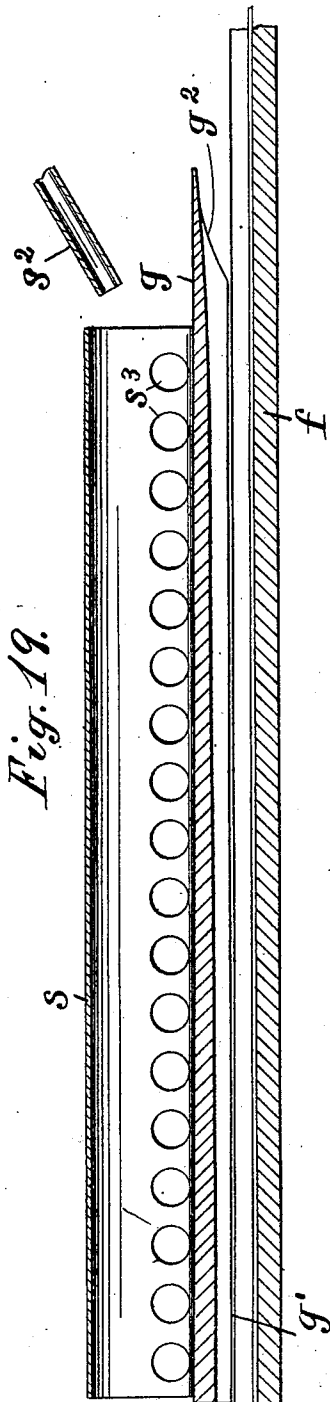


Fig. 19.

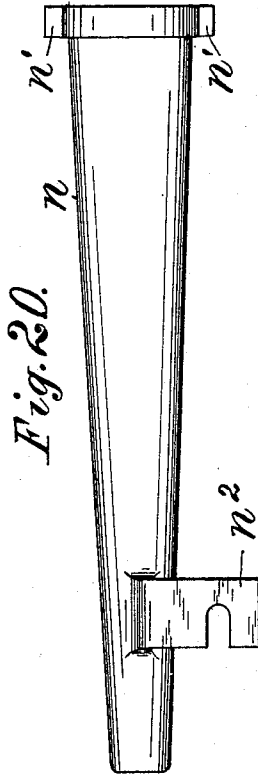


Fig. 20.

Fig. 22.

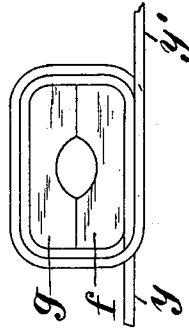
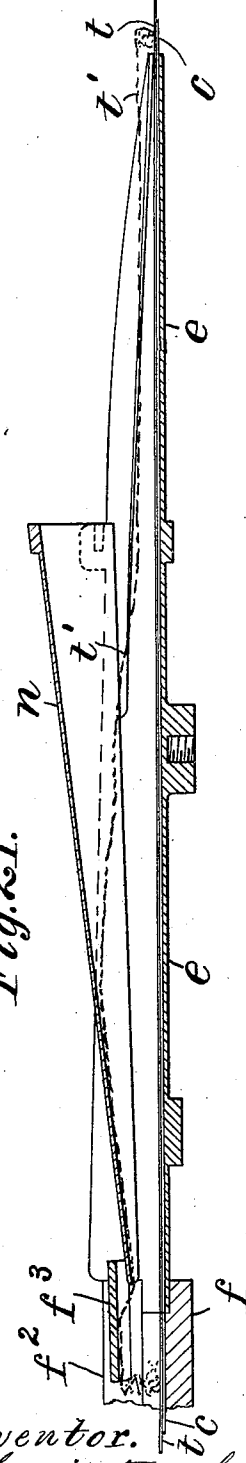


Fig. 21.



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UNITED STATES PATENT OFFICE.

FRANK J. LUDINGTON, OF WATERBURY, CONNECTICUT.

CIGARETTE FORMING, WRAPPING, AND IRONING APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 711,986, dated October 28, 1902.

Application filed December 4, 1901. Serial No. 84,609. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. LUDINGTON, a citizen of the United States, residing at 27 West Main street, Waterbury, county of New Haven, State of Connecticut, have invented certain new and useful Improvements in Cigarette Forming, Wrapping, and Ironing Appliances, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to furnish a machine for manufacturing automatically the highest class of cigarettes, of which so-called "Turkish" cigarettes are a sample. The Turkish cigarettes are made of oval form and have labels printed upon them in gold and colors, and when made by hand the filling is inserted in the wrapper, which has previously been made into a shell, with especial care to secure uniform density and smoothness, so that the cigarette has a firm elastic feeling when grasped in the fingers and betrays no lumps or irregularities of texture to the feeling. Such cigarettes are often made with a pasted seam, which is as smooth and perfect as the remainder of the wrapper, and all of these characteristics must be found in a machine-made cigarette to compete successfully with the hand-made article.

In the machines heretofore made for manufacturing Turkish cigarettes of oval form and printing the required labels thereon it has been found that the filler has generally lacked uniformity of texture, which gave it an uneven feeling to the fingers, as the appliances heretofore used have not distributed the tobacco perfectly in the filler. In the machines for making such high-grade cigarettes the filler has usually been shaped by means of wheels, between which the tobacco moved with such rapidity that the compression produced very little permanent effect. To obviate this defect, I furnish in the present invention a concave smoother, which is very long in relation to its width, and thus operates directly upon the surface of the tobacco for a considerable length of time and serves to gradually equalize the disposition of the tobacco in the filler and to smooth and compress its surface, so that when confined in the wrapper it possesses an entirely uniform elasticity and texture throughout.

In the machines referred to in making Turkish cigarettes with narrow lap it has been found that the mechanical pasting of the seam wrinkled the paper along the line of the seam, and the filler not having been smoothed before wrapping left indentations or pits on the surface of the finished cigarette, and that such wrinkled seam and indented or pitted surface plainly betrayed the machine make of the article. To produce such a seam of absolutely perfect character, I provide in the present invention a heated ironing device which presses upon the seam for a considerable length of time after it is pasted and operates to simultaneously dry and smooth the seam and to remove all wrinkles in the surface of the wrapper. In the present invention I dispense entirely with wheels for pressing and shaping the tobacco filler and feed the tobacco to a continuous wrapper upon a tape in the usual manner and conduct it through a feed-guide or gathering device, which molds the wrapper into U shape. I extend a trough-shaped smoothing-guide beneath the tape while in this form for a relatively great distance (compared with the diameter of the filler) and apply the concave smoother directly to the surface of the tobacco as it moves along with the filler to the seaming and pasting devices. The smoother is thus disposed intermediate to the feeding-guide and the first folder and properly disposes and smooths the surface of the tobacco in the filler before the wrapper is closed thereon. The continuous cigarette as soon as the seam is pasted is conducted beneath a cap adapted to press upon the seam, and the cap is heated to a suitable degree to smooth and iron the seam. The first folder is thus located intermediate to the smoother and the ironing device, and a perfect continuous cigarette is formed by the instrumentalities operating in the following order: first, the gathering device or feeding-guide, which molds the wrapper into the U shape; second, the smoother, which presses directly upon the surface of the tobacco in the trough-shaped wrapper; third, the first folder, which folds down one edge of the wrapper, over which the paste is applied by the paste-wheel to its other edge; fourth, the ironing device, which unites and seals the edge of the wrapper and presses upon the seam and dries the same

without wrinkles. The concave smoother and the ironing-cap are both inclined gradually toward the trough which supports the wrapper, thus operating to increasingly compress the tobacco and the filled cigarette in its movement thereunder.

An illustration of my invention is shown in the annexed drawings, in which I have shown a plan of the cigarette-forming devices and an elevation of that part of the cigarette-machine which supports such devices. The parts for feeding the tobacco to the wrapper and for cutting up the continuous cigarette are not shown, as they form no part of the present invention. In fact, existing machines designed to form a continuous cigarette can with very little change be adapted to use the novel features of my construction, and my invention can thus be conveniently applied to such machines.

Figure 1 is a plan of the cigarette-forming devices; Fig. 2, an elevation of the same with part of the frame of a cigarette-machine. Fig. 3 is a side elevation of the cigarette-forming devices upon a larger scale. Fig. 4 is a plan of the same. Fig. 5 shows the right-hand end of the feed-guide with the tape therein at line 5 5 in Fig. 3. Fig. 6 shows the left-hand end of the feed-guide at line 7 7 in Fig. 3. Fig. 7 shows the right-hand end of the smoothing-guide at line 7 7 in Figs. 3 and 4. Fig. 8 is a section on line 8 8 in Figs. 3 and 4. Fig. 9 is a section on line 9 9 in Figs. 3 and 4. Fig. 10 is a section on line 10 10 in Figs. 3 and 4 looking toward the left. Fig. 11 is a section on line 11 11 in Figs. 3 and 4 looking toward the right, and Fig. 12 is a section on line 12 12 in Fig. 3. Fig. 13 is a top view of the concave smoother; Fig. 14, a view at its left-hand end; Fig. 15, a view at its right-hand end. Fig. 16 is a longitudinal section of the smoothing device with part of the feeding device at the right-hand end and part of the first folder *p* at the left-hand end. Fig. 17 is a side view of the ironing-cap with its heater, and Fig. 18 shows the under side of the same. Fig. 19 is a longitudinal section of the ironing device. Fig. 20 is a plan of the cover for the barrel feed-guide, and Fig. 21 a longitudinal section of the barrel-guide with part of the smoothing device at its left-hand end. Fig. 22 is an end view of cigarette-guide with electric heater.

The tape *c* is shown in certain of the figures, but the paper wrapper *t* is omitted from all except Figs. 7 to 11, inclusive, and Fig. 21, as it conforms in shape and movement to the tape and is too thin to be easily distinguished upon the surface of the tape. In Figs. 1 and 2 the frame *a* is shown provided with shafts *a'*, carrying wheels *b* *b'*, upon which an endless tape *c* is driven. The wheels overhang the side of the frame, and a plate *d* and brackets *d'* project from the top of the frame beneath the tape to support the cigarette-forming devices. In Figs. 1 and 2 the feeding device is designated, collectively, 1, the smooth-

ing device 2, the first folder 3, and the ironing device 4. The wrapper *t* is shown led from a reel *j* through first, second, and third printing devices *z* *z'* to the upper side of the tape at the feeding end of the machine, as is usual, and the mouth *k* of a hopper is shown in dotted lines adjacent to the feeding device 1 to discharge the tobacco continuously upon the tape. The tape in my invention is used much narrower than the paper wrapper, so as to fully expose the seam when passing through the ironing device.

Feeding device.—The feeding device comprises the barrel feed-guide *e*, formed at one end to receive the flat tape *c*, as shown in Fig. 5, and at the other end to discharge it of the usual trough shape, as shown in Fig. 6. The barrel-guide has notched lugs *m* on top near the middle of its length, and a concave tapering cover *n* is formed with ears *n'* to engage the notches, and close to the smoothing-guide the cover is formed with a foot *n²*, adapted to clamp upon a seat *n³*, formed upon the side of the feed-guide. A screw *n⁴* clamps the foot upon the seat, and packing *n⁵* may be inserted between the two, as shown in Fig. 6, to vary the size of the filler delivered beneath the cover. The nozzle of the cover *n* is projected into the receiving end of the smoothing-guide *f*, as shown in Fig. 21.

The upper surface of the tobacco is indicated by the rough dotted line *t'*. The cover, as shown in Fig. 21, is tapered from the smoothing-guide outwardly considerably beyond its contact with the tobacco to prevent any of the tobacco from flying out of the trough-shaped wrapper when the wrapper is turned rapidly from the flat to the trough-shaped form by the rapid movement of the tape through the guides.

Smoothing device.—The smoothing device comprises the smoothing-guide of trough shape, as shown in Fig. 7, and formed in practice of a bed part (designated *f*) and cheek-pieces *f'* *f²*, extended upward from the sides of a concave groove *f⁴* in the bed-piece to hold the tape *c* in trough shape, as shown in this figure. One of the cheeks, *f²*, is shown in Fig. 4 extending to the end of the first folder, while the other one, *f'*, is shown extended nearly to the end of the first folder and forms a part of the folder, as it performs the same function therein as in the smoothing-guide of holding the tape in trough shape at one side and performs the additional function of supporting the edge of the wrapper to which the paste is applied.

The smoother *f³*, as shown in Fig. 7 and in Figs. 13 to 16, inclusive, is formed with a concave face to press upon the tobacco and is supported upon the cheek-piece *f'* by feet *u* near its opposite ends, and such feet are clamped by screw *u'*. A packing *u²* is shown between each foot and the cheek-piece, and a suitable variation in the thickness of the two packings permits the adjustment of the smoother at any desired angle to the trough

of the smoothing-guide. The smoother and the trough-shaped smoothing-guide operate conjointly to give the tobacco filler the desired shape and dimensions to seam the wrapper thereon. The smoother is shown in Fig. 16 adjusted at its left-hand end to compress the filler to its final dimensions and inclined upward slightly toward its receiving end, which is arranged to extend a little over the delivery end of the cover *n*. The tobacco which has been compressed by the cover in the feed-guide is thus permitted to expand upwardly as it enters the smoothing device, and the friction of the concave smoother is thus enabled to operate upon the surface of the tobacco to equalize its distribution in the wrapper and to thus secure a smooth surface and body for the filler. The upper side of the tobacco as it passes from the feed-guide to the smoothing device is indicated by the rough dotted line *t'*, which indicates the natural expansion of the tobacco when compressed hastily in the feed-guide 21, which, in effect, operates merely to gather the tobacco into the form of a filler, but which does not press upon it long enough to give it any permanent "set." The expansion of the tobacco, which occurs as it enters the smoothing-guide, permits the smoothing-guide to operate independently in rearranging and smoothing the particles of tobacco. The inclination of the concave smoother forms a tapering channel which increasingly and very gradually compresses the tobacco in its movement therethrough, and although the movement of the tobacco with the tape in this class of machines is quite rapid the length of the smoother enables it to operate upon the tobacco for a sufficient length of time to set it in the form desired for the filler. It is essential to the operation of the concave smoother that it should be of considerable length relative to the diameter of the cigarette, so as to continue its operation upon the tobacco for a sufficient length of time in its rapid movement beneath the smoother.

First folder.—The first folder may be of any suitable form, as its function is merely to fold one edge of the trough-shaped wrapper upon the tobacco and allow the paste to be applied to the other edge in a manner already well known. It is shown with the usual folding-plate *p*, which turns one edge of the tape upon the top of the filler and holds the other edge vertically, as shown in Figs. 8 and 9, to receive the paste from the wheel *g*. (Shown in Figs. 1 and 9.) One edge of the wheel is indicated by dotted lines in Fig. 9. Such pasted edge is then folded over the other in the usual manner by the sloping edge *g*² upon the end of the ironing-cap *g*. (Shown in Fig. 18.) One edge of the tape is led outwardly, as shown in Figs. 10 and 11, through a slit *g'*, formed at one edge of the cap *g*, thus fully exposing the seam to the heated cap. The bottom guide for the smoother, the first folder, and the ironing device is shown continuous in the drawings, as it is de-

signed to impart the same shape to the lower side of the filler or cigarette in all the stages of its formation. When thus constructed, it furnishes a convenient means of connecting the devices together and holding them in line with one another, and I have made claim to such construction herein. The smoothing device, the first folder, and the ironing device may, however, be made with separate bottom guides and secured in line with one another by any suitable means, as their combination is independent of the continuity of the bottom guide.

Ironing device.—The pasted cigarette thus passes directly into the ironing device. (Illustrated upon a large scale in Figs. 10, 11, 17, and 19.) This consists, essentially, of a heated cap adapted to press upon the seam and smooth and iron the same. The cap is made most effective and the cigarette molded to its required shape and ironed upon all sides most perfectly by forming a cigarette-guide with a channel adapted to fit closely about the seamed cigarette and heating the walls of the channel, especially upon the side next the seam, so as to iron the cigarette in its movement through the channel. For convenience of access to the trough and for the adjustment of the cap to vary its compression the cap *g* is fitted removably upon the cigarette-guide *f*. The cigarette-guide or the cap may be heated by any suitable means, and while I have shown a gas-heater (in the figures referred to) in the drawings steam, hot air, a flame, or electric current may be used for supplying the required heat. The gas-heater shown consists of a tube *s*, slotted upon one side, forming two edges, which are inserted in longitudinal grooves *s'* in the cap *g*, and a flame projected within the tube by the Bunsen burner *s*², the nozzle of which is shown in Figs. 3 and 4 provided with a tubular shank *v*, to which a gas-pipe would be attached and air drawn in through holes *v'* in the usual manner. Holes *s*³ are shown along the base of the tube to supply air for combustion, and the gas operates with such construction to form a blue flame throughout the entire length of the tube, which heats the cap *g* in the desired degree. The attachment of the cap to the cigarette-guide or trough-piece *f* necessarily operates to heat the groove which supports the cigarette, and a heated channel is thus formed which envelops the whole cigarette and irons it with heat and pressure while it passes through the channel, thereby insuring permanency to its shape in cross-section. A cut-off guide *w* is shown at the left end of Fig. 2, to which the continuous cigarette *w'* is delivered as the tape passes around the wheel *b*, and the cigarettes are cut into the required length by any suitable means. Boxes *z z'* are shown upon the frame in Fig. 2 to represent the printing devices which print upon the wrapper at regular intervals in two or more colors, and the wrapper is led through such boxes and passes

thence over the wheels *b'* to the surface of the tape, as already described.

Operation of the apparatus: The tape *c* is driven continuously through the several devices by the wheel *b*, carrying the paper wrapper with it, its grip upon the paper wrapper depending chiefly upon the grip exercised by the tape in those parts of its course where it is folded over the top of the cigarette. The tobacco suitably prepared is fed uniformly and continuously through the hopper *k* to the wrapper *t*, moving thereunder with the tape *c*. The loaded wrapper is turned up into trough or *U* shape, the layer of tobacco is bunched in the center of the wrapper, and the cover *n* is adjusted to compress the tobacco in a suitable degree for delivery beneath the receiving end of the concave smoother *f*³. The tobacco is gathered by the action of the barrel feed-guide and compressed by its cover *n* merely for introduction to the smoothing-guide; but the barrel-guide operates only as a gathering device to gather the flat layer of tobacco into a strip of loose texture. Such strip of tobacco is not dense enough to bear any handling, but requires to pass directly from the nozzle of the barrel-guide into the smoothing-guide. The smoother is so adjusted as to release the pressure upon the tobacco when it first enters the smoothing device, which permits the smoother to rearrange the particles in some degree and equalize the distribution of the tobacco as it is gradually compressed by the smoother. The filler formed in this manner is not compacted in such a manner as to bear handling or movement independent of the trough-shaped wrapper, but is in a loose and elastic condition, exactly such as is desired for a high-class cigarette. The taper of the smoother reduces the tobacco a little below its finished size and sets it sufficiently to permit the first folder to hold the tobacco easily in such form. One edge of the *U*-shaped wrapper is then folded upon the tobacco by the first folder *p*, and the paste is then applied to the other edge, which is turned down upon the first by its passage into the mouth of the ironing device. The pasted cigarette then moves through the gradually-contracted channel of the ironing device, the entering end of which is so proportioned by the adjustment of the cap *g* as to permit a slight expansion of the cigarette, caused by the elasticity of the filler, which tends to tighten the seam and smooth the whole body of the wrapper. In such condition the wrapped cigarette-rod is gradually compressed as it moves through the channel of the ironing device and the seam is smoothed as it is dried, so that in practice the cigarette is delivered with a perfectly uniform surface and texture and entirely free from wrinkles, indentations, or irregularities and is also permanently set to shape in cross-section, so that it does not lose its form by subsequent handling after it has been cut to cigarette lengths. One edge of the cap *g* is formed with a slit *g'* to permit the edge of the tape which

was folded down with the wrapper by the folder *p* to pass outside of the heated channel, as shown in Fig. 10. As the tape is narrower than the wrapper, the other edge of the tape, to which the letter *C* is applied in Fig. 11, laps only a little over the top of the cigarette, which fully exposes the seam and nearly the whole top of the cigarette to contact with the cap. Great difficulty has been experienced with the unheated pressers used in cigarette-machines of this character to hold the pasted edge of the seam down until it was dried, as the paste rubs off upon the presser and finally tears the paper or obstructs the movement of the cigarette. The application of heat to the cap or presser, as described herein, is found in practice to wholly prevent the transmission of paste to the cap and any fouling of the cap, which is thus enabled to operate permanently in smoothing the cigarette and in wholly permitting the wrinkles or roughness from appearing on the seam. The wrapper in this class of machines is liable to slip upon the tape, as the channels through which the wrapper, the filler, and the pasted cigarette are conducted are not of suitable length and dimensions to hold the wrapper in firm contact with the tape. In the present invention the pressure of the long smoother *f*³ upon the tobacco holds the tobacco down upon the tape, and thus in some degree prevents slipping; but the ironing device operates far more effectively to grip the wrapper to the tape, as it operates with protracted pressure upon the finished cigarette. In the ironing device the tape is wrapped partly over the top of the cigarette, and the pressure of the wrapper upon the cigarette caused by the gradual contraction of the channel gives the tape a very firm grip upon the continuous cigarette, and thus operates to maintain a perfect uniformity in the speed of the cigarette in its movement from the printing devices to the cutter. Such uniformity of movement is of great importance where the cigarette is furnished with printed inscriptions, as is common with Turkish cigarettes, and I have found in practice that the application of the tapering channel to the continuous cigarette subsequent to the formation of the seam serves most effectively to prevent the slipping of the wrapper upon the tape and to deliver the continuous cigarette to the cutters with perfect uniformity. Such operation of the tapering channel is independent of its action as a heater or ironing device and is due to its compression of the cigarette within a fold of the tape. As such action of the tapering channel is of great value, I have made special claim thereto independently of the means by which the channel is heated.

From the above description it will be observed that the tobacco is partially released from pressure three times during the formation of the cigarette—first, in its passage from the barrel-guide to the smoother; second, in its passage from the smoother to the first

folder, and, third, in its passage from the first folder to the ironing device, which treatment of the filler I have found is very beneficial in practice in permitting the equalization of the tobacco in the filler by the repeated operation of the different agencies. Devices have been heretofore used to form an inherently densely compressed filler-rod to which a wrapper was subsequently applied; but it will be fully understood from the above description that my devices do not at any period of their operation form such a compressed or inherently dense filler-rod, but that the tobacco gathered and shaped by my agencies is in such a condition that it does not form any "rod" of tobacco or any assemblage of the tobacco which can be transferred across any gap whatever from one agency to another for applying the wrapper.

It will be understood that the nature of the feeding device is immaterial, as its function is merely to gather the tobacco upon the tape or wrapper in a suitable form for delivery to the smoothing device, and my invention may therefore be used in any continuous-cigarette machine which is provided with means for gathering the tobacco and delivering it to such smoothing device.

To illustrate a variation of the heating device for the cigarette-guides $f g'$, I have shown in Fig. 22 an end view of such guide with coils around the same, representing an insulated electric wire, having terminals $y y'$. Such wire is readily heated by a suitable current, and the temperature of the channel in the cigarette-guide can be very perfectly regulated by such means.

A very material advantage is secured in the manufacture of oval cigarettes by ironing them or moving them between oval heated surfaces, as such ironing sets the filler and the wrapper permanently in the oval shape and forms the sharp corners perfectly thereon. Machine-made oval cigarettes do not commonly retain their shape very long and when packed in a box have a constant tendency to assume the rounded form, so that after a while the corners entirely disappear, and the cigarette has merely a flat form with rounded edges. Such sharp corners upon both filler and wrapper are distinctive of high-grade cigarettes and especially of those made by hand, and one method of making the most perfect oval cigarettes is to press them in molds and subject the molds under pressure to heat in an oven for a sufficient length of time to set the filler and wrapper in the desired shape. Such operation is very tedious and expensive, while the ironing of the cigarettes when in the continuous form is readily effected by passing the oval cigarette through a tapering guide which is formed with corners at two opposite edges and heated so as to set the filler and wrapper in the desired shape. By propelling the continuous cigarette through my heated cigarette-guide

the cigarettes are permanently set to the desired shape in cross-section, so that they do not lose their form by subsequent handling and storage before they are used.

The subjection of a continuous cigarette to heat and pressure in a continuous process operates to improve its appearance and preserve its form in such a marked degree that I have made claim to such method of finishing cigarettes in a separate application, Serial No. 90,052, filed January 16, 1902, for patent on process of making cigarettes from a continuous rod.

I have found that the cigarette-guide of great length in proportion to its width applied to the cigarette after the wrapper is seamed is of material value in smoothing the wrapper and equalizing the distribution of the tobacco if the tobacco be permitted to expand as the cigarette-rod enters such guide, and this is the case whether the guide be heated or not. As such a guide may be termed a "finishing-guide" in its operation to smooth and finish the cigarettes and improve their appearance, (when the tobacco is permitted to expand as it enters such guide,) I have claimed the same by that name in the last claim of my specification.

Having thus set forth the nature of the invention, what is claimed herein is—

1. In a continuous-cigarette machine, the combination, with means for forming and propelling a continuous cigarette with seamed paper wrapper, of a trough-shaped guide to support the cigarette, a cap arranged and operated to press upon the seam of the wrapper, and means for heating the cap to smooth and iron the seam, substantially as herein set forth.

2. In a continuous-cigarette machine, the combination, with means for forming a continuous oval cigarette having corners at opposite edges, of means for seaming a paper wrapper thereon, and a cigarette-guide having cap to press upon the cigarette and shaped to form corners upon its opposite edges and means for heating the same to set the cigarette and its filler permanently in the oval form.

3. In a continuous-cigarette machine having an endless tape and paper wrapper carried thereby, the combination, with means for feeding the tobacco to the wrapper, of means for molding the filler into oval form with laterally-disposed corners, means for seaming the wrapper upon the filler, and a cigarette-guide of oval shape divided at the corners and means for heating the cap of the guide, to iron the cigarette and permanently set it in the oval shape.

4. In a continuous-cigarette machine, the combination, with means for forming and propelling a continuous oval cigarette with seamed paper wrapper, of a gradually-tapering cigarette-guide having corners at opposite edges, means for heating the guide to

set the cigarette in oval form, and means for cutting off the cigarettes, whereby cigarettes of permanently oval form are produced.

- 5 A cigarette-machine having means to form a continuous cigarette without pressing-wheels or rotary pressers, and comprising an endless tape adapted to carry a paper wrapper, means for feeding the tobacco to the wrapper, a feed-guide for receiving the loaded tape and wrapper and bending them into U shape, a stationary cover in such feed-guide for compressing the tobacco to form a filler, a first folder or seaming device to form the seam upon the wrapper, and a U-shaped smoothing-guide arranged intermediate to the feeding-guide and such first folder, with a concave smoother supported therein to press directly upon the surface of the tobacco before the wrapper is folded over the same, the concave smoother being very long relatively to its width and adjusted to form a slightly-tapering channel to gradually equalize the distribution of the tobacco in the filler before the wrapper is seamed upon the same.
- 25 6. A cigarette-machine having means to form a continuous cigarette without pressing-wheels or rotary pressers, and comprising an endless tape adapted to carry a paper wrapper, means for feeding the tobacco to the wrapper, a feed-guide for receiving the loaded tape and wrapper and bending them into U shape, a stationary cover in such feed-guide for compressing the tobacco to form a filler, a first folder or seaming device to form the seam upon the wrapper, and a U-shaped smoothing-guide arranged intermediate to the feed-guide and such first folder, with a concave smoother supported therein to press directly upon the surface of the tobacco before the wrapper is folded over the same, the concave smoother being very long relatively to its width and adjusted to form a slightly-tapering channel, and means for adjusting the opposite ends of the smoother independently to vary its pressure upon the tobacco so as to gradually equalize its distribution before the wrapper is seamed upon the same.
- 40 7. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper, of a feed-guide for bending the tape and wrapper into U shape, a concave cover for compressing the tobacco in the feed-guide to form a filler, a U-shaped smoothing-guide extended from such feeding-guide, a concave smoother supported within the smoothing-guide and having its end next the cover extended over the same, the smoother being arranged to press directly upon the surface of the tobacco and forming a tapering channel to increasingly compress the tobacco in its movement there-through, and means for varying the relation of the cover and the concave smoother, to vary the degree of compression exerted respectively by such cover and smoother in succession upon the tobacco.

8. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with the tape and means for feeding the tobacco to the wrapper, of the gathering device comprising the trough-shaped gatherer *e* formed at one end to receive the flat tape and at the other end to discharge it in U shape, and having upon its top lugs *m* with notches extended rearwardly and having also the seat *n*³, and the tapering cover *n* having ears *n*¹ to engage the said notched lugs, and foot *n*² fitted to the seat and held thereon by screw *n*⁴, and the foot having slot fitted to the screw to permit the removal of the entire cover rearwardly for examination of the tobacco.

9. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper and means for folding the wrapper and forming the seam, of a cigarette-guide having a channel adapted for the passage of the seamed cigarette, a cap to press upon the cigarette and means for heating the walls of the said channel whereby the cigarette is ironed in its passage through such channel.

10. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper and means for folding the wrapper and forming the seam, of a cigarette-guide having a channel adapted for the passage of the seamed cigarette, with its walls tapering to compress the cigarette in its movement and means for heating the walls of the channel to smooth and dry the seam.

11. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper and means for folding the wrapper and forming the seam, of a cigarette-guide having a channel for the passage of the seamed cigarette, the guide being divided to vary by adjustment the dimensions of the channel, and the channel tapered to compress the cigarette in its movement, and means for heating the walls of the channel to iron the cigarette in its passage therethrough.

12. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper and means for folding the wrapper and forming the seam, of a cigarette-guide having a channel for the passage of the seamed cigarette, the seam being disposed upon the top of the cigarette as set forth, and the guide having a trough in the bottom and cap upon the top formed each with one-half the channel, and a heater applied to the cap for drying and smoothing the seam in its passage thereunder.

13. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper and means for folding the wrapper and forming the seam, of

a cigarette-guide having a channel for the passage of the seamed cigarette, the seam being disposed upon the top of the cigarette as set forth, the guide having a trough in the bottom and cap upon the top formed each with one-half the channel, and a tube extended lengthwise upon the top of the cap, with means for projecting a flame within the tube to heat the cap for ironing the cigarette in its passage thereunder.

14. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper and means for folding the wrapper and forming the seam, of a cigarette-guide having a channel for the passage of the seamed cigarette, the seam being disposed upon the top of the cigarette as set forth, the guide having a trough in the bottom and cap upon the top formed each with one-half the channel, the cap having grooves, and a tube slotted and its edges secured in such grooves with holes at the sides of the tube to admit air, and means for projecting a flame within the tube downwardly upon the top of the cap to heat the same, as and for the purpose set forth.

15. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with means for feeding the tobacco to the wrapper, of a feed-guide for bending the tape and wrapper into U shape with a concave cover for compressing the tobacco form a filler, a U-shaped smoothing-guide extended from the delivery end of such feed-guide with a concave smoother supported therein, of great length relative to its width, and arranged to press directly upon the surface of the tobacco, a first folder with means for pasting the edge of the wrapper and forming the seam, and a cigarette-guide adapted to receive the seamed cigarette with the tape folded about the same, and having a channel slightly tapered in the direction of the movement of the tape to increasingly compress the tape upon the cigarette and prevent the slipping of the wrapper in its movement through the machine.

16. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a continuous bottom guide *f* having a trough-shaped groove, of the cigarette-forming devices attached to such guide comprising, first, the concave smoother *f*³, second, the first folder adapted to fold one edge of the wrapper upon the filler and to hold the other edge in position for the application of paste, and third, a cigarette-guide of great length relative to its width and having a channel adapted to receive the seamed cigarette, and the cap *g* adapted to smooth the seam and gradually compress the cigarette and set it to the desired form.

17. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a continuous

bottom guide *f* having a trough-shaped groove, of the cigarette-forming devices attached to such guide, comprising, first, the concave smoother *f*³, second, the first folder adapted to fold one edge of the wrapper upon the filler and to hold the other edge in position for the application of paste, and third, the cap *g* forming with the bottom guide a gradually-tapering channel, and means for heating such cap to iron the cigarette.

18. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a continuous bottom guide *f* having a trough-shaped groove, of the cigarette-forming devices attached to such guide comprising first, the concave smoother *f*³ with means for adjusting it vertically upon the guide, second, the first folder adapted to fold one edge of the wrapper upon the filler and to hold the other edge in position for the application of paste, and third, the cap *g* with means for heating the same and means for adjusting it vertically upon the guide, as and for the purpose set forth.

19. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a continuous bottom guide *f* having a trough-shaped groove, of suitable cigarette forming and seaming devices attached to such guide, and the cap *g* attached removably to the guide and forming a channel for the passage of the seamed cigarette, such cap being provided with a gas-jet pipe and with a tube to receive the flame from such pipe and confine it to the cap, and a handle to remove the heated cap with the tube when released from the guide.

20. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a feed-guide adapted to receive the flat tape and bend the same into U shape and having an inclined cover to press the tobacco in the guide, a seaming-guide adapted to fold and secure the seam, and a U-shaped smoothing-guide of great length relative to its width arranged intermediate to the feed-guide and seaming-guide, with a concave smoother pressed directly upon the surface of the tobacco in the smoothing-guide, and the cover of the feed-guide being projected beneath the concave smoother, whereby the tobacco is permitted to expand as it enters the smoothing-guide, and the distribution of the tobacco is thereby equalized by the smoother in its passage to the seaming device.

21. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a feed-guide adapted to receive the flat tape and bend the same into U shape and having an inclined cover to press the tobacco in the guide, a seaming-guide adapted to fold and secure the seam, and a U-shaped smoothing-guide of great length relative to its width arranged intermediate to the feed-guide and seaming-

guide, with a concave smoother pressed directly upon the surface of the tobacco in the smoothing-guide, the several guides being arranged to permit the repeated expansion of the tobacco as it passes from one to another, whereby the distribution of the tobacco is more perfectly equalized in the finished cigarette.

22. In a continuous-cigarette machine having an endless tape adapted to carry a paper wrapper, the combination, with a feed-guide adapted to receive the flat tape and bend the same into U shape and having an inclined cover to press the tobacco in the guide, a seaming-guide adapted to fold and secure the seam, and a U-shaped smoothing-guide of great length relative to its width arranged

intermediate to the feed-guide and seaming-guide with a concave smoother pressed directly upon the surface of the tobacco in the smoothing-guide, and a finishing-guide of great length relative to its width receiving the cigarette from the seaming-guide, and the several guides being arranged to permit the expansion of the tobacco as it passes from one to another, as and for the purpose herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FRANK J. LUDINGTON.

Witnesses:

L. LEE,

THOMAS S. CRANE.