(No Model.)

4 Sheets—Sheet 1.

F. J. HAGEN.

CIGARETTE MACHINE.

No. 522,895. Patented July 10, 1894

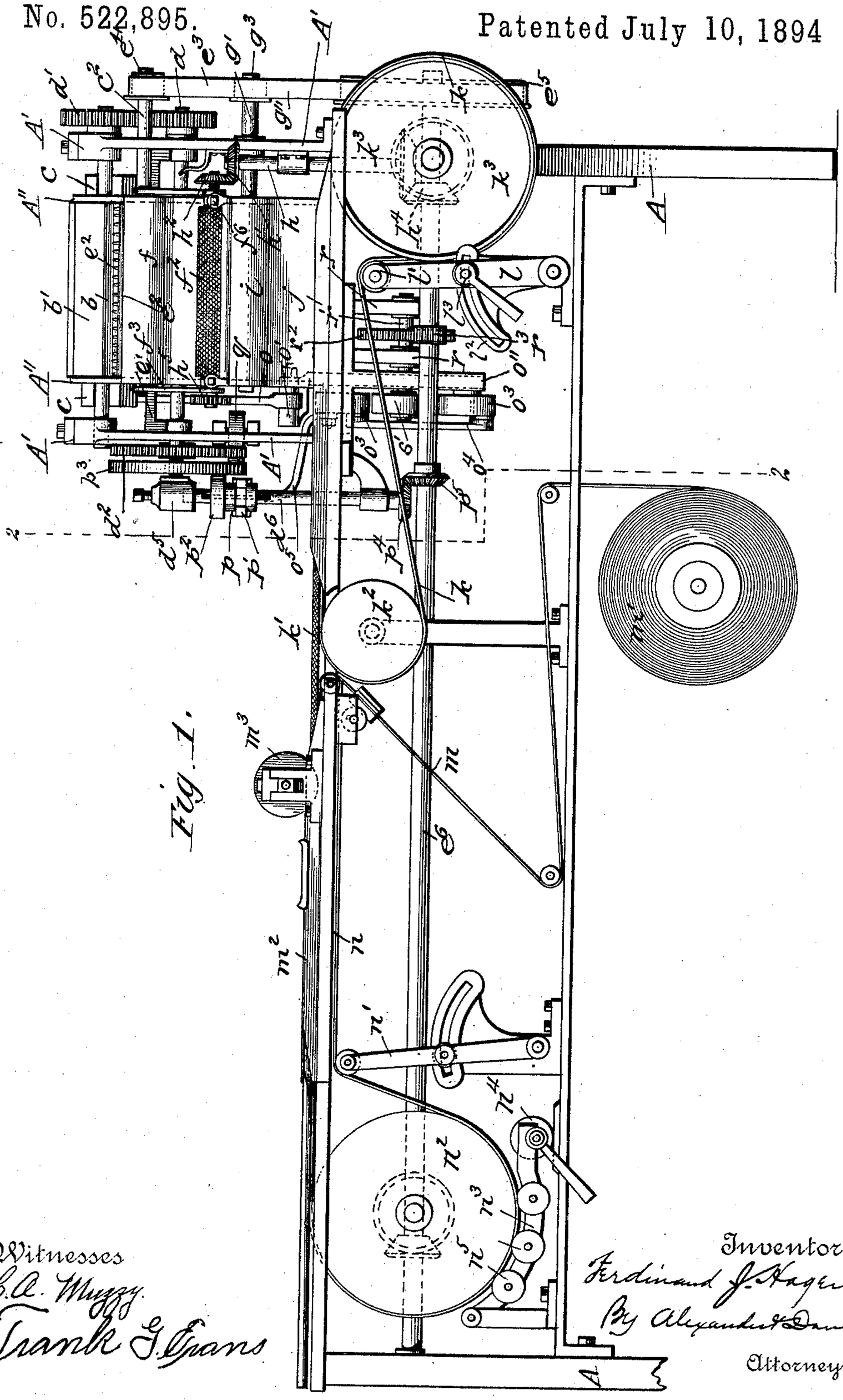

Fig. 1.

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(No Model.)

4 Sheets—Sheet 2.

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Fig. 2.

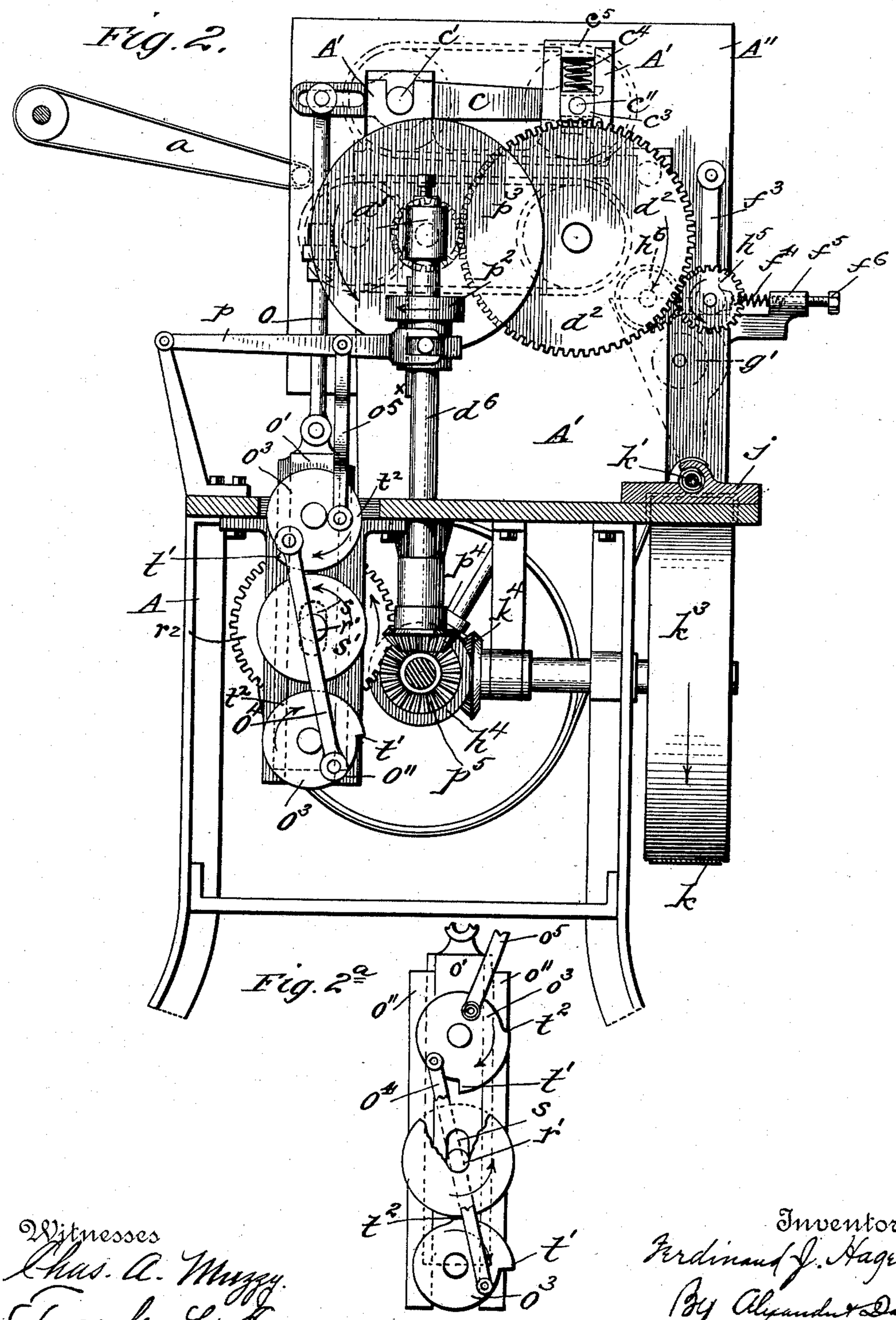

Fig. 2a.

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(No Model.) 4 Sheets—Sheet 3.

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CIGARETTE MACHINE.

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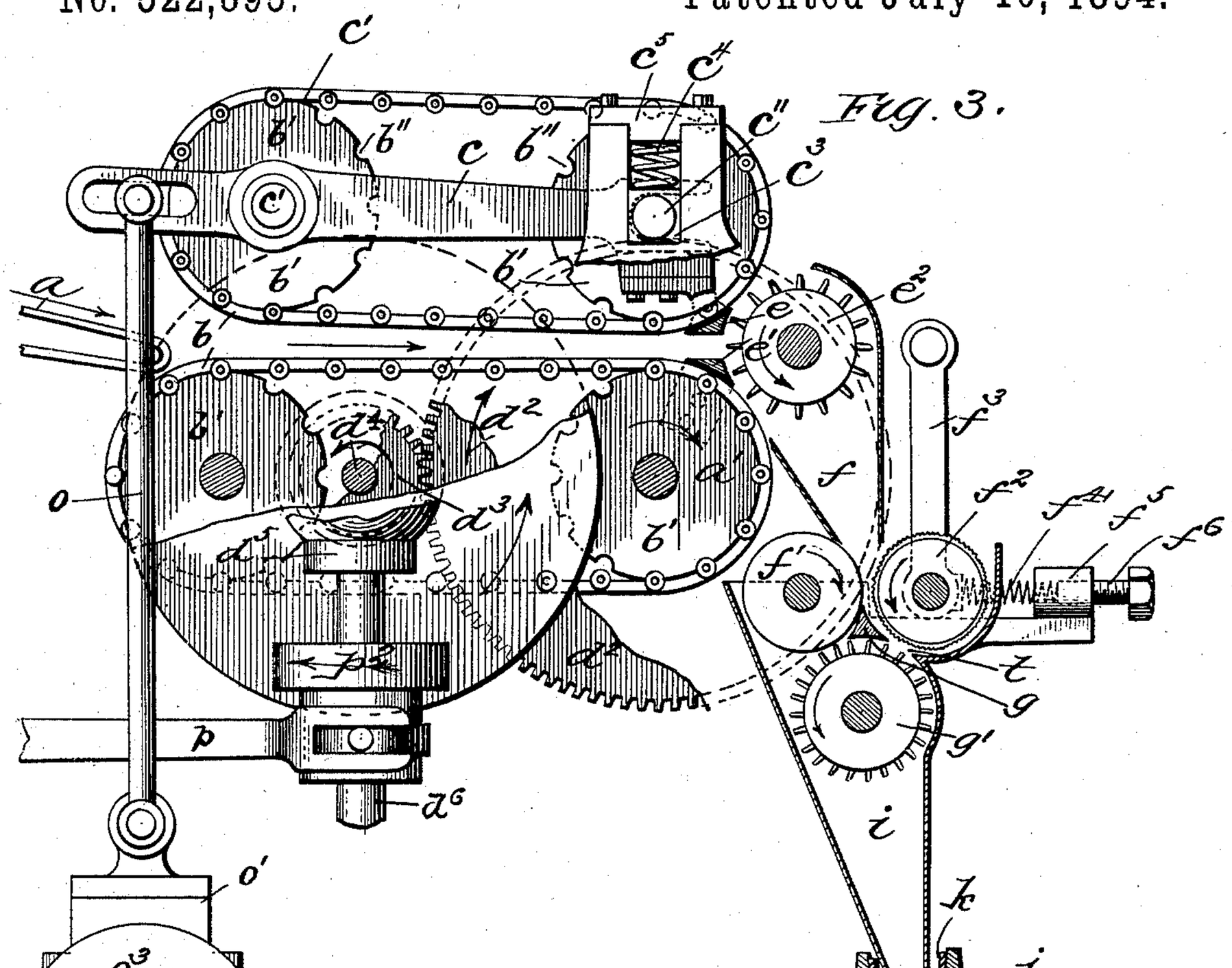

Fig. 3.

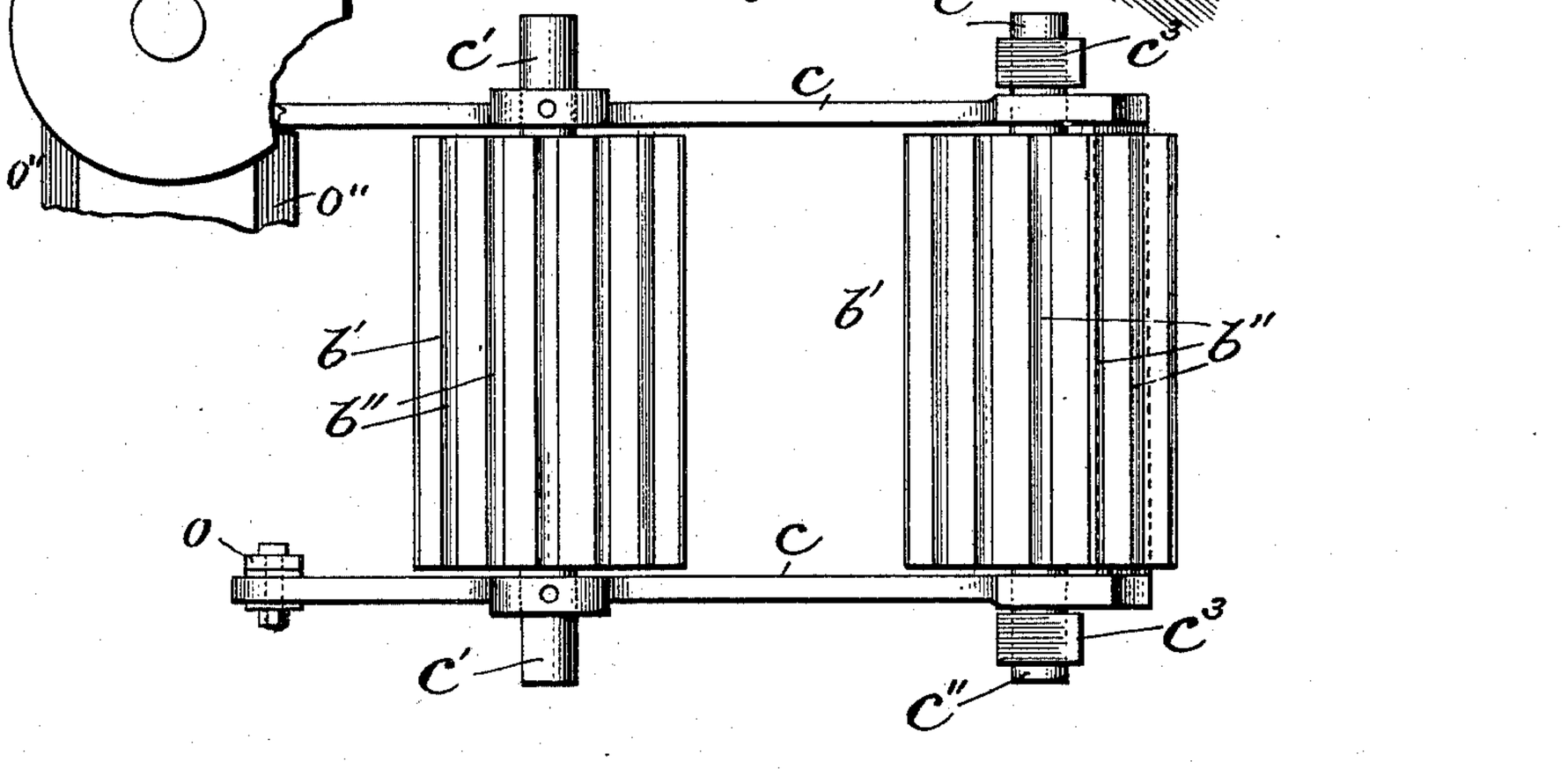

Fig. 4.

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(No Model.) 4 Sheets—Sheet 4.

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CIGARETTE MACHINE.

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Fig. 5.

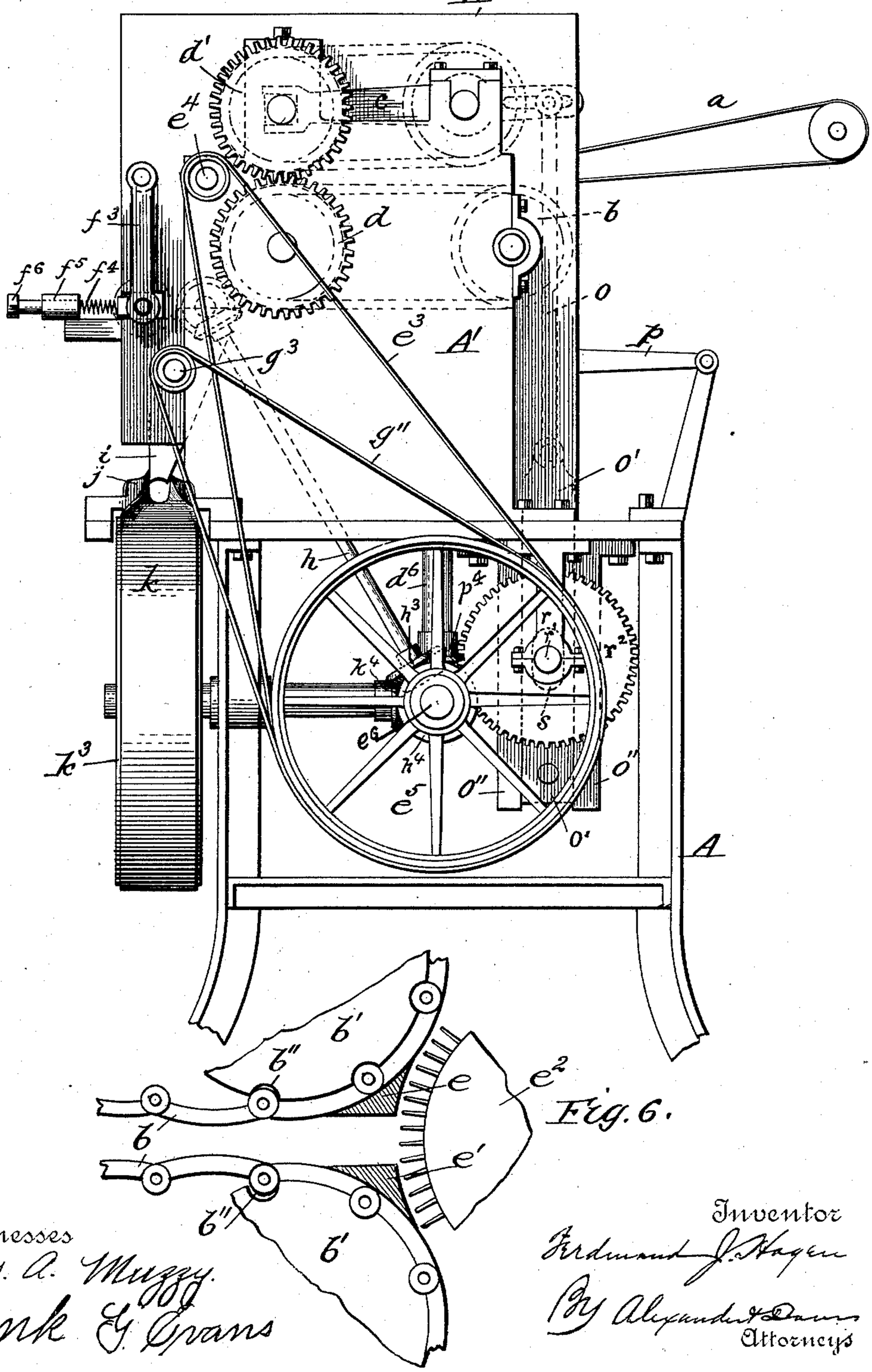

Fig. 6.

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UNITED STATES PATENT OFFICE.

FERDINAND J. HAGEN, OF NEW YORK, N. Y.

CIGARETTE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 522,895, dated July 10, 1894.

Application filed December 29, 1893. Serial No. 495,104. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND J. HAGEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Cigarette-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

In the drawings, Figure 1 designates a side elevation of a cigarette machine embodying my improvements; Fig. 2 a vertical section of the same, taken on the line 2—2 of Fig. 1; Fig. 2ª a detail view of the regulating cams. Fig. 3 is a vertical sectional view of the tobacco-feeding and disintegrating mechanism, some of the parts being broken away for the purpose of better illustration; Fig. 4 a detail plan view of the swinging-frame carrying the chain rollers; Fig. 5 an end view of the machine. Fig. 6 is a detail view showing more clearly the arrangement of the pressure guide-bars between the exit ends of the main feed-belt.

This invention relates to that class of machines known as the "continuous cigarette" machines, and it has mainly for its object to provide improved mechanism for uniformly feeding the tobacco to the forming-belt, said feeding mechanism being entirely automatic in its action, as more fully hereinafter appears.

A further object of this invention is to so arrange the filler-forming belt that it may be readily removed and replaced without disturbing the other parts of the machine, whereby a material saving in time is effected, as more fully hereinafter appears.

I will now proceed to describe the preferred construction for carrying out my invention, but it is understood that this construction may be departed from without departing from the spirit of the invention.

Referring to the drawings by letters, A designates the main frame of the machine and A′ a smaller frame mounted upon the table of the main frame at one end thereof; A″ designates a frame or casing mounted on the main table between the sides of the frame A′.

A feed-belt *a* of the usual construction is suitably mounted adjacent to the casing A″ and is adapted to convey the tobacco to the main feed-belts *b*, which are mounted upon rollers *b′* and are constructed of curved metallic links transversely pivoted together and extending entirely across the face of the rollers.

As stated, the links are curved transversely, so as to fit the curved faces of the rollers, and the rollers are provided with longitudinal grooves *b″* in their faces for the reception of the transverse hinges of the links.

The two rollers carrying the upper chain are mounted in a frame consisting of two parallel side-bars *c c*, the shaft *c′* of the front roller being rigidly fixed in said arms and the roller being loosely mounted on said shaft, while the rear roller is fixed on its shaft *c″* and said shaft is journaled loosely in longitudinal slots in the ends of the arms *c*.

The ends of shaft *c″* are extended outwardly beyond the arm *c* and journaled loosely in boxes c^3, which are free to work in vertical slots formed in the frame A′, thereby permitting said shaft *c″* and its roller to vibrate vertically a limited distance; the boxes c^3 are normally held down in the lower ends of their slots by means of coil-springs c^4 held in place by caps c^5. The ends of shaft *c′* are also extended and journaled in the sides of the frame A′, thereby forming the fulcrum or oscillating point of the side bars or levers *c*.

The rollers of the lower chain or belt *b* are mounted rigidly on their shafts and the shafts are extended and journaled in the frame A′, and the upper belt or chain is driven in unison with the lower belt by means of a gear *d* secured on one end of the rear lower shaft and meshing with a similar gear on the vibratable shaft *c″*, the teeth of these gears being sufficiently long to enable the upper gear to move vertically a short distance without becoming disengaged from the lower gear.

The shaft of wheel *d* is driven by means of a large spur gear d^2 secured on its opposite end outside of casing A′, and this gear d^2 is driven by a pinion d^3 secured on a short shaft d^4, whose inner end is journaled in the casing A′ and whose outer end is journaled in a bearing d^5 mounted on the upper end of a vertical shaft d^6, hereinafter described.

Between the exit or rear ends of the chain belts are located a pair of pressure guide bars *e e′*, the former being carried by the levers or

frame-bars *c*, thereby being vertically vibratable, and the latter being secured at its ends rigidly to the frame A′. These two bars are formed exactly alike in cross-section, their adjacent faces being flat and directly in line with the adjacent faces of the belts, and their faces next to the belts being transversely curved or concaved correspondingly to the curvature of the rollers *b′* and fitting nicely against the belts as they pass around the rollers, the edges of the bars formed by the junction of these two faces being sufficiently sharp to scrape or remove the tobacco from the chains and direct it between the two bars. The rear edges or faces of the bars are concaved to correspond to the curvature of a roller or shaft e^2 journaled in the frame *a′*, directly to the rear of said bars, and driven by means of a belt e^3, connecting a pulley e^4, secured on one of its ends, to a larger pulley e^5 secured on the end of the main shaft e^6 journaled in the main table.

The shaft or roller e^2 is provided in its surface with a series of short pins or spikes, which pass close to the curved faces of bars *e e′* and receive the tobacco and deposit it in a chute or funnel *f* supported between the side frames A″.

The funnel *f* deposits the tobacco between a pair of rolls f' f^2, the former of which is journaled stationarily in the frame A″ and is provided with a smooth surface, and the other roll f^2 is journaled in the lower ends of swinging links f^3 pivoted on the casing A″. The roller f^2 is kept resiliently pressed toward the roller f' by means of springs f^4 bearing against the lower end of links f^3 and adjustably supported in sockets f^5, mounted on a suitable part of the frame, by means of set screws f^6, these screws serving to vary the pressure exerted by the springs.

Supported between rolls f' f^2 is a scraper-bar *g*, which is substantially triangular in shape and has its upper sharpened edge bearing upon the surface of the smooth roll f' to scrape the tobacco therefrom, while the face adjacent to the roll f^2 is concaved to correspond with that roll. The lower side of the bar *g* is concaved to correspond with the curvature of a spiked-roller *g′*, mounted in the frame A″ and driven by a belt *g″* passing over a pulley g^3 on the shaft of roller *g′* and over the pulley e^5 on the main shaft.

The roll f' is driven by a vertical shaft *h* carrying a beveled gear *h′* on its upper end which meshes with a similar gear h^2 on the shaft of said roll f', said shaft h^2 being driven by means of a beveled gear h^3 secured on its lower end and meshing with a similar gear h^4 on the main shaft.

The roll f^2 is driven at a speed corresponding to the roll f' by means of small gears h^5 h^6, secured on the adjacent ends of the shafts of said rollers, the teeth of the gears being sufficiently long to allow the roll f^2 to vibrate slightly without disengagement.

A funnel-shaped casing *i* embraces the rolls f' f^2 and g' and serves to convey the disintegrated tobacco into a trough *j* supported along the side edge of the main table. The endless filler-forming belt *k* travels in the trough *j* and serves to compress the tobacco into a continuous filler *k′*. To accomplish this the trough *j* is formed with a U-shaped groove where it receives the tobacco from the chute *i*, as shown in Fig. 3, and from that point its side edges are gradually turned over to a circular shape, as shown in Fig. 2, whereby the edges of the belt are folded over upon the inclosed filler to compress it to the desired density or into a rod of tobacco. The belt *k* is mounted upon pulleys k^2 k^3 supported at the sides of the main frame A, out of the way of the other mechanism, the larger roller k^3 being driven by a beveled gear k^4 secured on the inner end of its shaft and meshing with the beveled pinion h^4 on the main shaft.

Upon the frame A, at a point between the pulleys k^2 k^3, is mounted a belt-tightener, which consists of a vertical arm *l* pivoted at its lower end on the frame and carrying a roller *l′* at its upper end, adapted to support the slack of the belt and keep it taut, said arm being readily adjustable upon a suitable slotted segment l^2 by means of a lever nut l^3.

It will be observed that by lowering the belt-tightening arm the belt may be readily slipped off its pulley and out of the trough, and as readily replaced by a new belt. This capability of readily replacing the forming-belt is an essential feature as it saves valuable time consumed in changing the belt in the machines now in use.

As the filler *k′* leaves the forming belt it passes onto the paper *m*, which is unwound in the usual manner from a roll *m′* and passed through a suitable folding and pasting device m^2, by which it is folded and pasted around the filler.

A suitable presser wheel m^3 may be mounted at the inlet end of the folder to compress the filler previously to being wrapped in the paper. The paper is carried through the former or folder by means of the usual belt *n* which is kept taut by means of a tightener *n′*. Below the large pulley n^2, carrying belt *n*, is a frame n^3 pivoted at one end and vertically adjustable at its other end, by means of a cam n^4, and carrying a series of rollers n^5 adapted to bear upon the surface of the belt as it passes over pulley n^2 and thereby serve to smooth the wrinkles out of the belt and prevent the same slipping. The means for pasting and folding the paper around the filler are not claimed in this application.

The means for automatically regulating the feed is constructed as follows:—Adjustably connected to the extended end of one of the levers *c* is a vertical rod *o* which is pivotally connected at its lower end to a vertical slide *o′* working in vertical ways *o″* supported on the main frame A. The slide carries two cams o^3 which are similarly constructed and

connected together by a vertical pitman o^4. The upper cam is connected by a rod o^5 to a pivoted lever p which has one of its ends forked so as to embrace pins p' carried by a non-rotating collar fitted in a groove in the hub of a friction wheel p^2. The friction wheel p^2 is connected to shaft d^6 by means of a spline and feather, whereby it will be compelled to revolve with said shaft d^6 but may be moved vertically thereon. The friction wheel p^2 bears against the face of a larger friction disk p^3, carried by the short shaft d^4, hereinbefore mentioned. The shaft d^6 is driven by means of a beveled pinion p^4 which meshes with a similar pinion p^5 on the main shaft. As shown in Fig. 1, a roller q is journaled in the frame A′ and adapted to bear upon the inner face of the friction disk p^3 and thereby prevent the thrust of the friction wheel p^2 from displacing said disk p^3.

Journaled in hangers r, depending from the table of the main-frame is a short shaft r' carrying a gear wheel r^2, meshing with a pinion r^3 on the main shaft d^6. One end of the shaft r extends through a vertical slot s formed in the slide o' and carries a friction wheel s' at a point between the two cams o^3, the distance between the cams being slightly greater than the diameter of the said friction wheel s', as shown most clearly in Fig. 2.

The operation of the machine is as follows: The opposing chain-belts b receive the tobacco from the feed-belt a and convey it between the pressure bars e e', slightly compressing it during its passage between the belts. As will be seen, the adjacent faces of the bars e e' must be formed substantially flat and must always be exactly in line with the adjacent faces of the belts; should the upper bar not move exactly in unison with the upper belt and keep exactly in line with the working face of the belt, the tobacco would either choke up between the belts or be pulled out too rapidly from between the bars by the spiked wheel, as is evident. This peculiar arrangement of the bars is necessary in order that the feed be sensitive to the continually varying thickness of the tobacco. As the compressed body of tobacco is forced between the pressure guide bars e e', it is shredded and disintegrated by the rapidly-revolving spiked roller e^2 and deposited in the funnel f, which in turn deposits it between the rollers f' f^2. The latter rollers, being rapidly revolved in unison and in opposite directions and being held resiliently together, again compress the tobacco and carry it downward; as the tobacco is carried downward it is scraped from the smooth roll by scraper-bar g and delivered to an opening t between the bar g and the casing i, and as it falls through this opening the spiked wheel g', revolving rapidly, further shreds or combs the tobacco before delivering it to the forming belt below. By means of this feeding and shredding mechanism the tobacco is deposited in the belt uniformly, whereby the filler will be of a uniform density throughout. As will be seen, the spring-pressed corrugated roller f^2 compresses the tobacco against scraper-bar g until it is taken off by the spiked roller.

Should the body of tobacco passing between the pressure bars vary in thickness, the mechanism shown and described will instantly adjust itself so as to increase or decrease the speed of the chain-belts, according as the body of tobacco becomes thinner or thicker, and thereby compensate for the varying thicknesses and maintain at all times a uniform supply to the forming belt. As will be seen, to drive the chain-belts faster it is simply necessary that the friction wheel p^2 be moved nearer to the center of disk p^3 and to decrease the speed of the belts it is simply necessary to move said wheel p^2 toward the periphery of the disk p^3. As the body of tobacco diminishes the upper pressure bar e and the rear end of the frame carrying it will be depressed by springs c^4 to conform to the thinner supply, and this action will raise the rod o and bring the lower cam into contact with the slowly-revolving disk s'. When the lower cam o^3 comes in contact with the disk of the wheel s' it will be turned in the direction of the arrow shown in Fig. 2, which will, through the medium of pitman o^4, turn the upper cam in the direction of the arrow shown and thereby raise rod o^5 connected to the lever (p) controlling friction wheel p^2; this action will raise the wheel p^2 and move it nearer to the center of the disk p^3 and thereby more rapidly drive the mechanism operating the chain-belts. When the thickness of the tobacco increases the operation will be the reverse of that just described—that is to say, the slide carrying the cams will be lowered sufficiently to rest the upper cam on friction wheel s', which will reverse the movement of this cam and draw down the friction wheel p^2 toward the periphery of disk p^3, thereby diminishing the speed of the feed-belts.

The only part of the periphery of each of the cams that comes into contact with the friction-wheel is the enlarged part (between t' and t^2), shown most clearly in Fig. 2^a. The pitman is so connected to the cams that when the larger end t' of the upper cam-surface is adjacent to the friction-wheel the smaller end t^2 of the lower cam-surface is adjacent to the opposite edge of the friction-wheel, and vice versa. When the upper cam drops upon the friction-wheel it is carried around in the direction of the arrow and the speed of the chain-belts is gradually lowered; should the feed continue sufficiently thick to keep said cam pressed against the friction wheel the cam will continue to turn until the smaller part p^2 of its surface is reached, at which point the turning of the cam and the downward movement of the slide carrying the cam is arrested by the upper end of slot s coming into contact with shaft r'. This movement will bring the larger part t' of the lower cam around into position, so that when the feed

becomes sufficiently thin to raise the lower cam into contact with the friction-wheel, the operation will be the reverse of that just described, the slot *s* serving also to limit the upward movement of the slide.

Having thus fully described my invention, what I claim is—

1. In a cigarette machine, the combination of a frame, a pair of adjacent rolls f' f^2, means for pressing one roll yieldingly toward the other roll, a scraper-bar *g* supported between the lower sides of said rolls and having its upper edge sharpened and bearing against the stationary roll and its rear edge or side curved to conform substantially with the yielding roll, a spiked-roll g' journaled close to the under side of said scraper bar, and a casing *i* enveloping said rolls and receiving the shredded tobacco, a part of said casing extending inward to near one of the lower edges of this scraper to form the narrow opening *t*, whereby the yielding roller will normally press the tobacco against the curved face of the scraper as the tobacco leaves the stationary roll and the spiked roller will shred the tobacco as it passes through said opening *t*, substantially as described.

2. In a cigarette machine, the combination of mechanism for feeding the tobacco, a pair of rolls f' f^2 supported adjacent to each other, one of the rolls being corrugated and yieldingly supported, a scraper adapted to remove the tobacco from the smooth roll, and a spiked roller adapted to take the tobacco from the scraper, and a casing surrounding said rollers, substantially as described.

3. In a cigarette machine the combination of a pair of adjacent rolls, a scraper supported between the lower sides of said rolls and having its upper edge sharpened and bearing against one of the rolls, the lower side of said scraper being curved transversely and its side adjacent the other roll being also curved transversely, means for taking the tobacco from said scraper and combing it, and a casing enveloping said rollers, substantially as described.

4. In a cigarette machine, the combination of a frame, a pair of opposing feed-belts, a pivoted frame carrying the upper feed-belt said frame being pivoted at its forward end and adapted to oscillate at its rear end, means for normally depressing the forward end of the frame, mechanism for taking the material from the exit end of the belt, variable mechanism for driving the belts in unison, and devices connecting the oscillating belt frame to the variable driving mechanism, whereby the vibratory movement of the belt-frame will automatically regulate the speed of the belt, substantially as described.

5. In a cigarette machine, the combination of a frame, a pair of opposing feed-belts, a pivoted frame carrying the upper feed-belt said frame being pivoted at its forward end and adapted to oscillate at its rear end, means for normally depressing the forward end of the frame, a pair of guide-bars supported between the rear ends of the belts and adapted to take the material therefrom, the upper guide-bar being mounted upon the rear end of the belt-frame so as to oscillate therewith, means for taking the tobacco from the guide-bars, variable mechanism for driving the feed-belts in unison, and devices connecting the vibratable frame with the variable mechanism, whereby the speed of the feed-belt will be governed automatically by the thickness of the material passing between the belts, substantially as described.

6. In a cigarette machine, the combination of a frame, a pair of feed-belts, a pivoted frame carrying the upper feed-belt, said frame being pivoted at its forward end and adapted to oscillate at its rear end, means for normally depressing the rear end of this frame, mechanism for taking the tobacco from the rear end of the belts, gearing for operating the belts in unison, variable devices for operating the gearing, said variable devices consisting essentially of a disk carried by the shaft of one of the gears and a driving disk movably mounted on an adjacent driving shaft and devices for operating this driving shaft, these devices being connected to the vibratable belt frame, substantially as described.

7. In a mechanism for feeding tobacco, the combination of a yielding feed-belt, variable mechanism for driving said feed-belt, and devices for operating said variable mechanism, said devices being operated or adjusted by the movement of the yielding belt and consisting essentially of a pair of similarly constructed cams adapted to operate in unison, a movable slide carrying the cams and a friction wheel supported between the cams, substantially as described.

8. In a mechanism for feeding tobacco or other material, the combination of a feed belt and variable mechanism for operating the same, and automatic devices for operating said variable mechanism, said devices consisting essentially of a slide a pair of cams journaled upon said slide and connected together to operate in unison, a friction wheel supported between the adjacent peripheries of the cam, gearing for continuously rotating this friction wheel, and devices for adjusting said slide, substantially as described.

9. In a machine for feeding tobacco, the combination of a pair of feed belts, gearing for operating said feed-belts a friction disk, as p^3, for driving said gearing, a shaft, as d^6, journaled adjacent to said friction disk, an adjustable driving disk or wheel on said shaft d^6, an adjustable slide carrying a pair of cams, means connecting said cams together and to said friction driving wheel, and a friction wheel supported between the cams and adapted to partially rotate the same, substantially as described.

10. In a machine for feeding tobacco, the combination of a feed-belt and variable mechanism for driving the same, automatic de-

vices for regulating said variable mechanism, said devices consisting essentially of a friction wheel and gearing for driving the same, a slide slotted for the passage of the shaft of said friction wheel, devices for adjusting said slide, two cams journaled on said slide on opposite sides of the friction wheel and devices connecting said cams together and to the variable driving mechanism, substantially as described.

11. In a mechanism for feeding tobacco, the combination of a yielding feed-member, mechanism for driving said feed-member, and devices for adjusting said driving mechanism, said adjusting devices being operated by the movement of the yielding feed-member and consisting essentially of a pair of cams adapted to operate in unison, a movable part carrying the cams, and a friction wheel supported adjacent to the cams, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FERDINAND J. HAGEN.

Witnesses:
W. E. BENJAMIN,
W. M. COX.