No. 750,160. PATENTED JAN. 19, 1904.

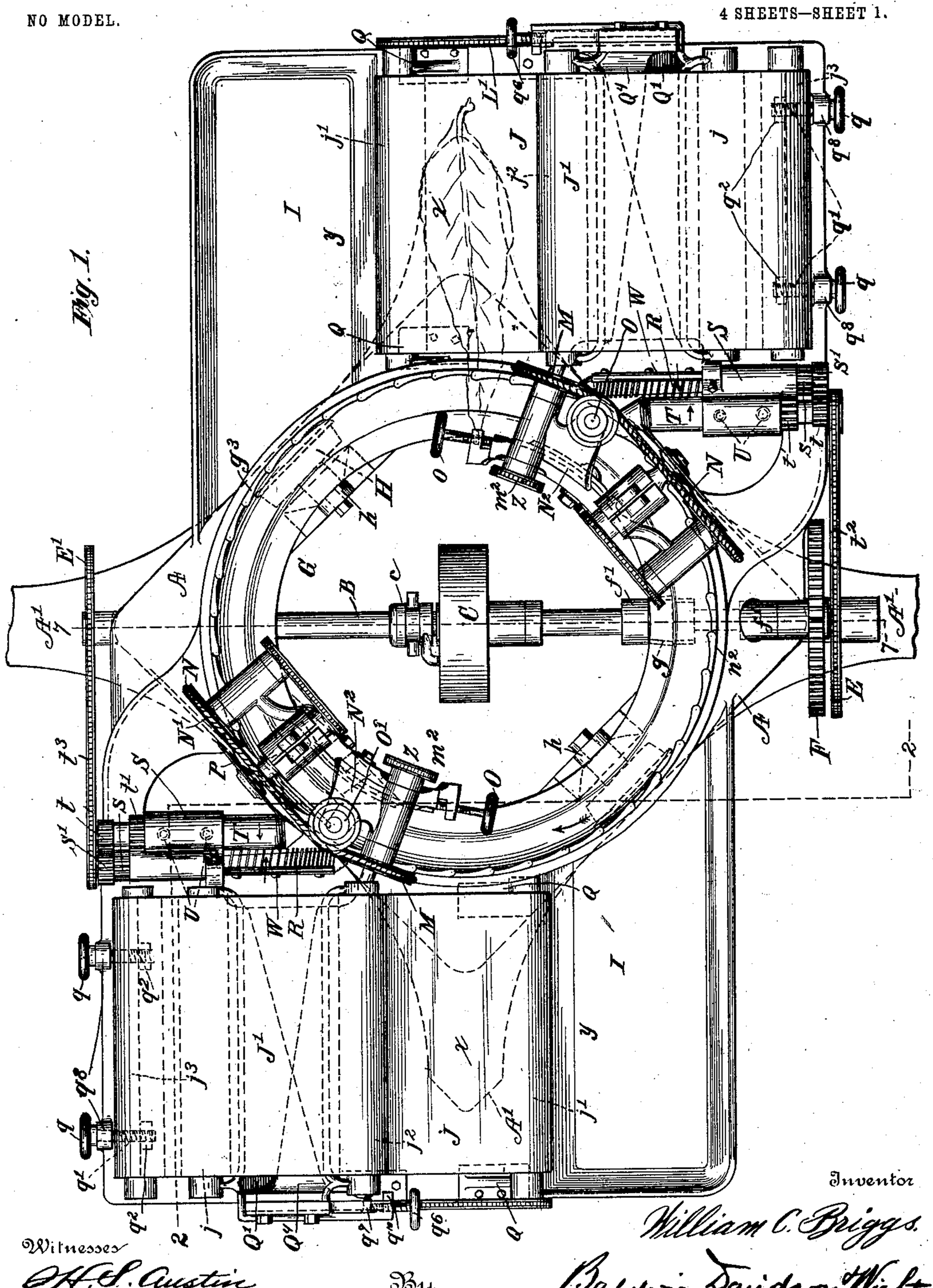
W. C. BRIGGS.

MACHINE FOR STEMMING TOBACCO LEAVES.

APPLICATION FILED OCT. 1, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



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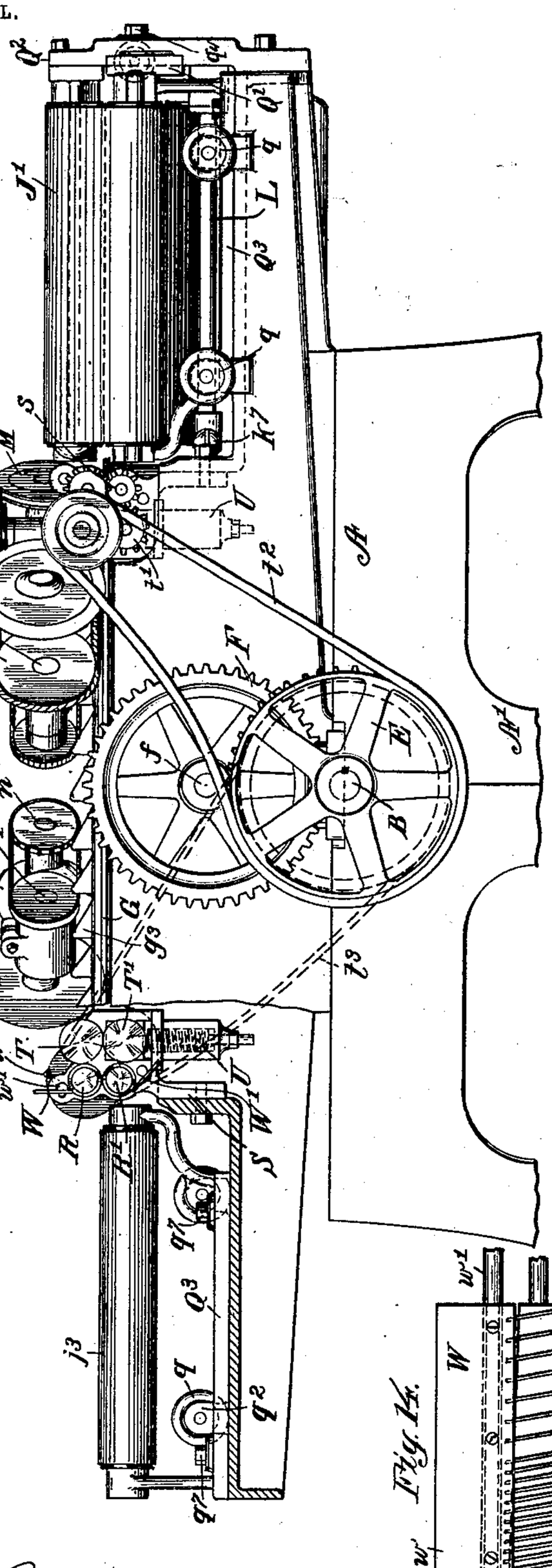

Fig. 2.

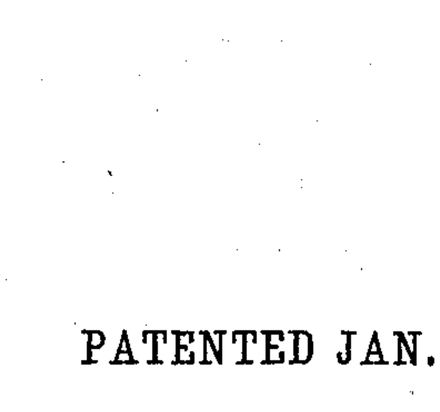

Fig. 16.

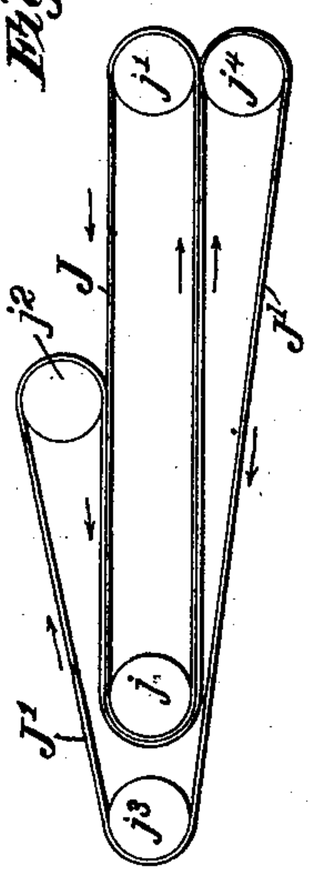

Fig. 3.

Fig. 14.

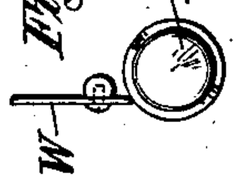

Fig. 15.

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NO MODEL. 4 SHEETS—SHEET 3.

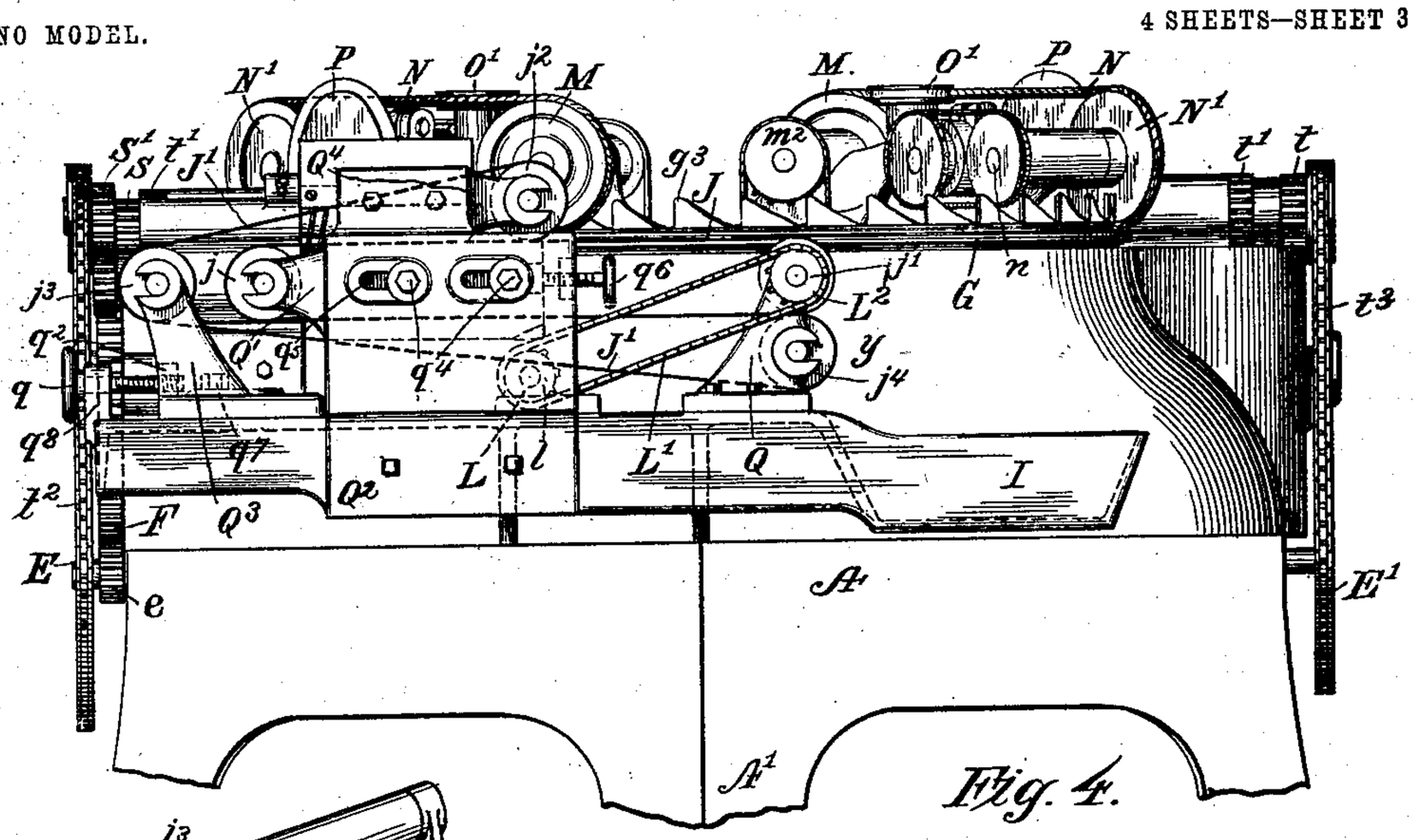


Fig. 4.

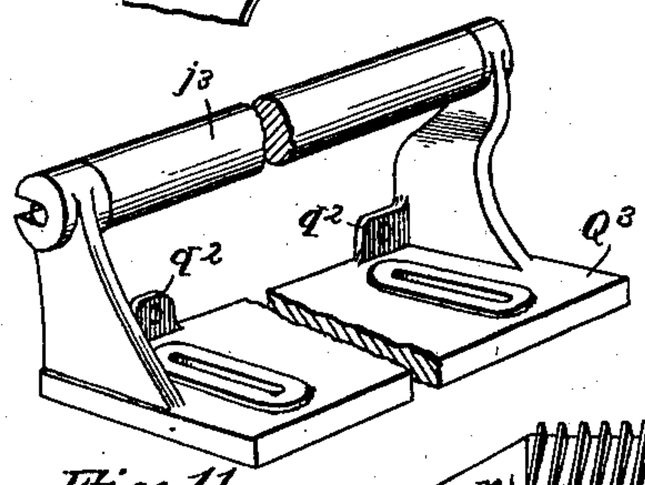


Fig. 11.

Fig. 5.

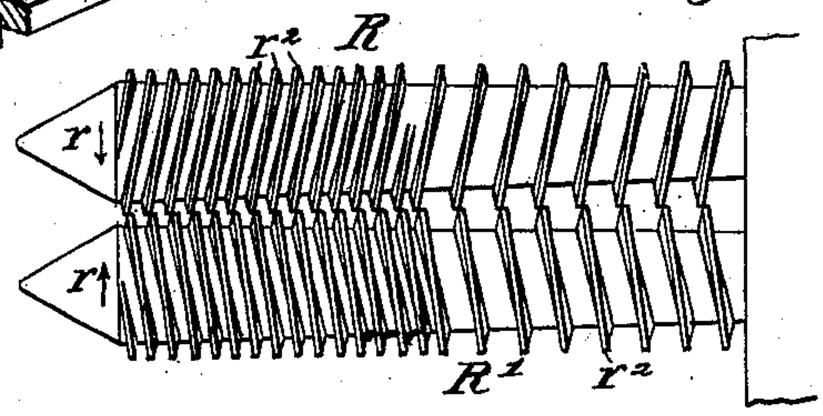
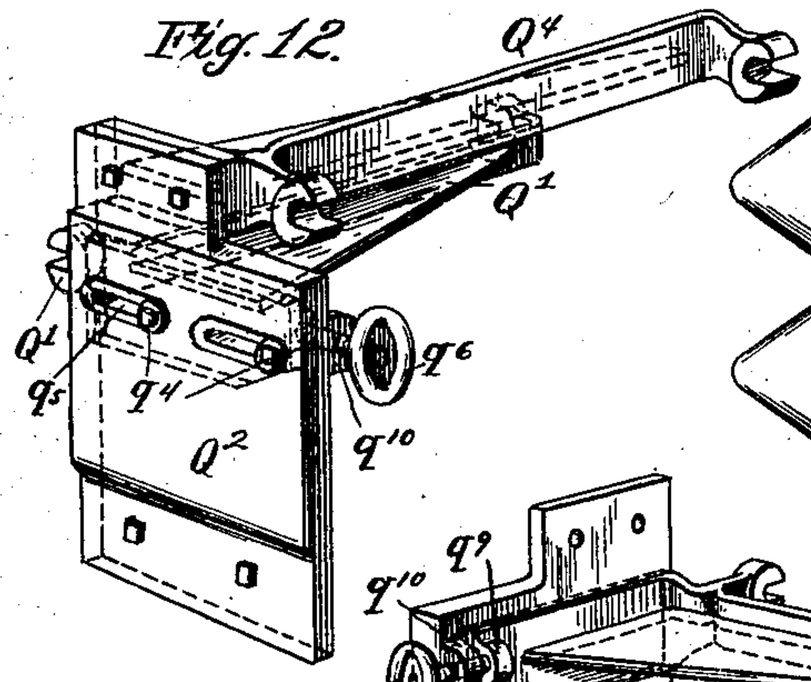


Fig. 12.



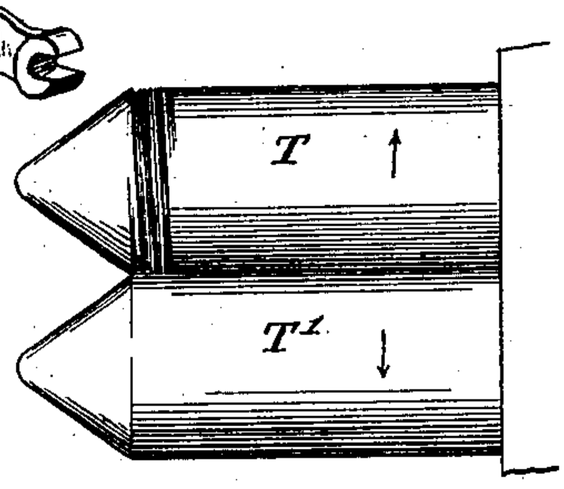


Fig. 6.

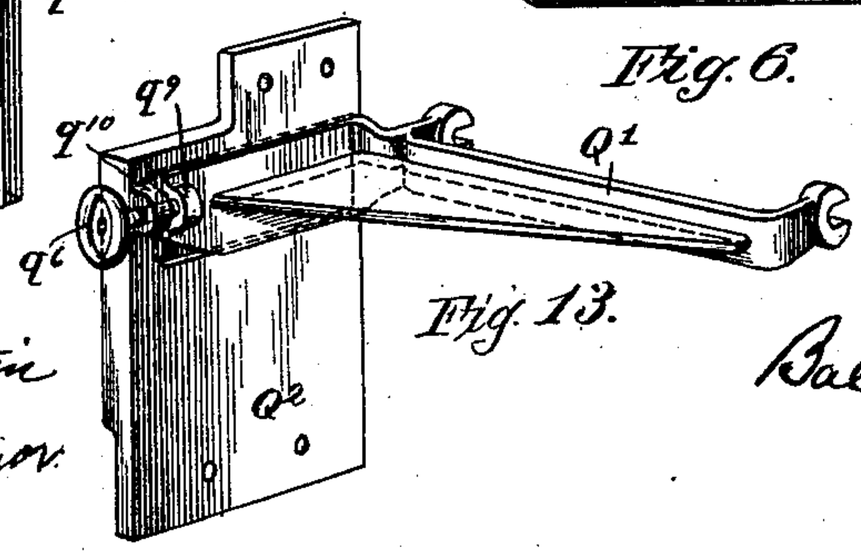


Fig. 13.

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W. C. BRIGGS.

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APPLICATION FILED OCT. 1, 1902.

NO MODEL. 4 SHEETS—SHEET 4.

Fig. 7.

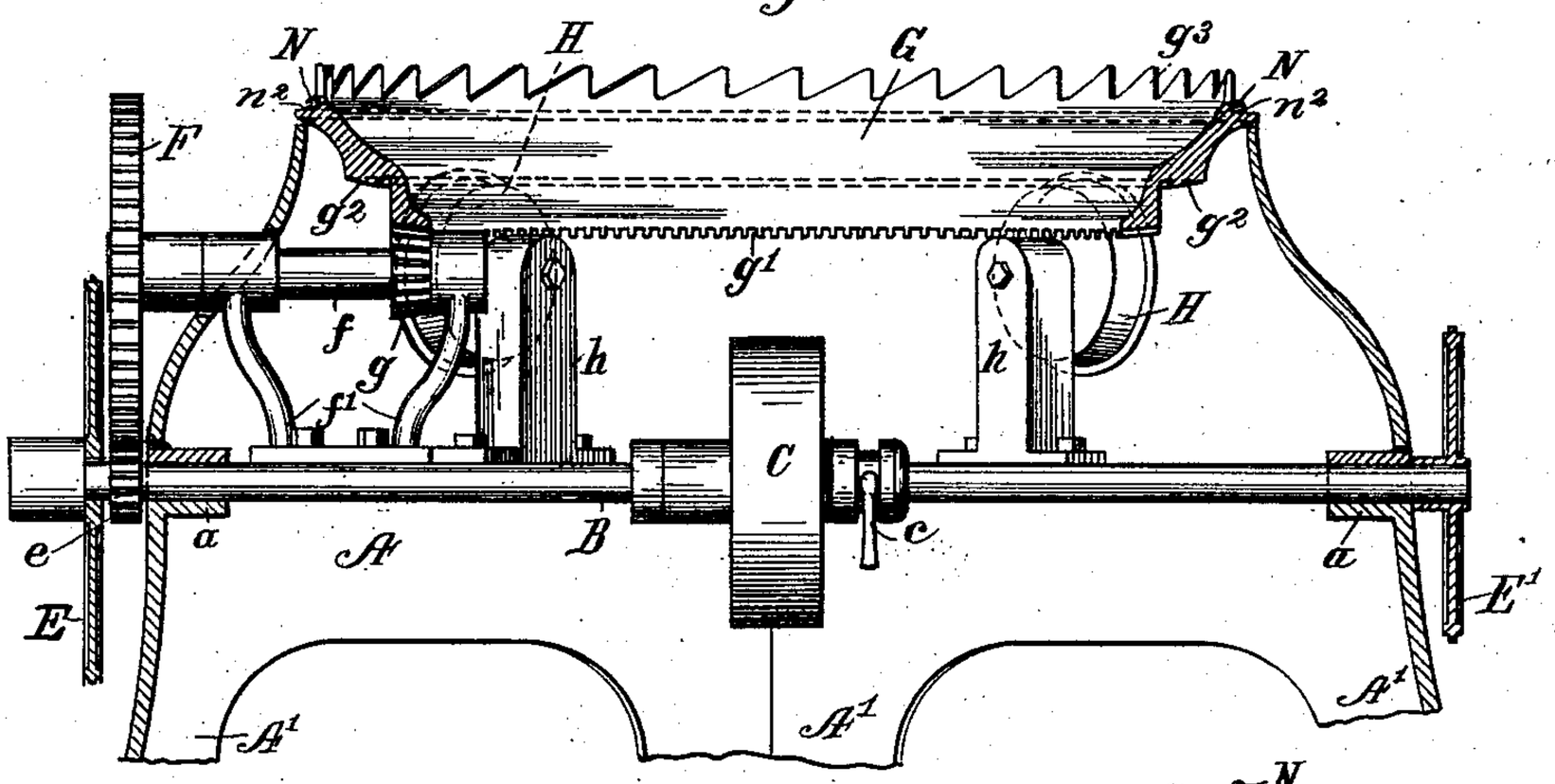


Fig. 8.

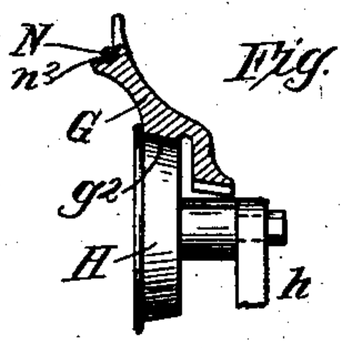


Fig. 9.

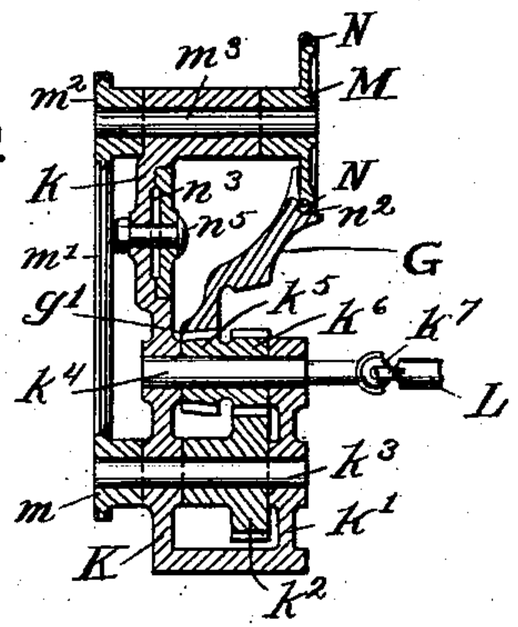
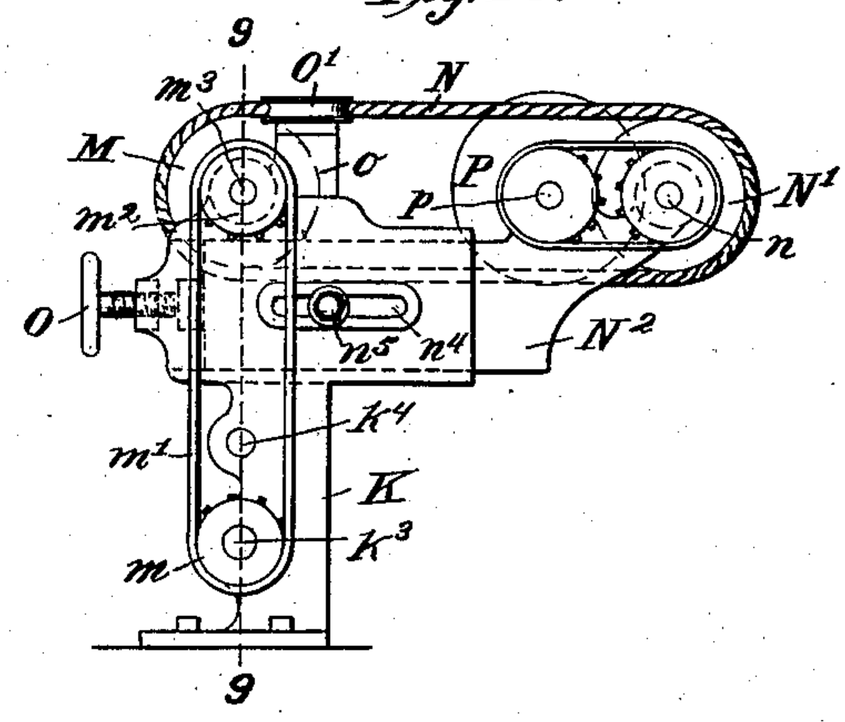


Fig. 10.



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No. 750,160. Patented January 19, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM C. BRIGGS, OF WINSTON-SALEM, NORTH CAROLINA.

MACHINE FOR STEMMING TOBACCO-LEAVES.

SPECIFICATION forming part of Letters Patent No. 750,160, dated January 19, 1904.

Application filed October 1, 1902. Serial No. 125,579. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. BRIGGS, a citizen of the United States, residing at Winston-Salem, in the county of Forsyth and State of North Carolina, have invented certain new and useful Improvements in Machines for Stemming Tobacco-Leaves, of which the following is a specification.

My invention more especially relates to machines for removing the stems from tobacco-leaves; and my object is to provide a machine of this class which will operate on tobacco-leaves of all sizes and kinds to rapidly remove the stems therefrom without tearing or mutilating the good parts of the leaves to an injurious extent.

A further object of my invention is to so construct the machine that it will run smoothly and at a high speed without danger of choking, while being simple in construction and containing comparatively few main parts, which are so geared together as to operate harmoniously at proper relative speeds.

In most machines of this class the stems are removed by stripping the wings of the leaf therefrom from the inner or butt end of the leaf outward, while in my improved machine I prefer to operate in an opposite direction, first detaching the portions of the leaf on opposite sides of the stem near the tip and then severing the tip of the leaf from the main body of the leaf, after which the stemming operation proceeds, the stem being drawn in one direction, while the wings of the leaf are held back as the stem is drawn forward, the stem being finally entirely separated. While this operation is proceeding, the leaf is moved sidewise, and choking or crowding of the stemming mechanism is thus avoided.

This method of procedure resembles that practiced by hand, and it is much better to stem the leaves in this way, because the "laterals" of the leaves incline toward the tip, and if the wings are pulled from the butt toward the tip they will tend to gather around the stem instead of separating therefrom; but when the wings are pulled from the tip toward the butt this tendency is avoided, the wings being stripped from the stems with great facility.

The means which I employ for feeding the leaves to the mechanism preferably consists, first, of overlapping aprons which carry the leaves sidewise toward the stemming mechanism and, second, an annular toothed carrier coöperating with an endless band which holds the leaf in engagement with the carrier in such manner that the leaf is carried properly into engagement with the stemming mechanism. Soon after the leaf has been engaged by the stemming mechanism a portion of the leaf on opposite sides of the stem at the inner end of the tip is separated from the stem, and immediately after this the front or outer end of the stem and the portions of the wings of the leaf attached thereto, which constitute what is commonly called the "tip," are separated by a knife from the stem, which projects from the main body of the leaf. When this is done, the severed tip falls upon the floor or into a suitable receptacle, while the main body of the leaf continues through the stemming mechanism, which, briefly stated, consists of two tapered threaded rolls which coöperate with two stem-drawing or traction rolls revolving in a direction opposed to that of the stemming-rolls and acting to draw the stems forward while the stemming-rolls push the wings of the leaf backward or retard their forward movement, and thus strip them from the stem.

The stemming-rolls are of peculiar formation. They will be hereinafter fully described; but one of their important functions is to allow the stem of each leaf to move longitudinally between them, while at the same time moving transversely thereto.

In the drawings, Figure 1 shows a top plan view of my improved machine. Fig. 2 is a view mainly in front elevation, but partly in section on line 2 2 of Fig. 1. Fig. 3 is a diagram of the feed-aprons. Fig. 4 shows a front elevation. Fig. 5 is a detail view, on an enlarged scale, of the stemming-rolls. Fig. 6 is a detail view, on an enlarged scale, of the stem-drawing or traction rolls. Fig. 7 shows a section of the machine on the line 7 7 of Fig. 1. Fig. 8 is a detail view showing how the toothed carrier-ring is supported. Figs. 9 and 10 are views of the mechanism for operating the end-

less band that coöperates with the toothed carrier to feed the leaves to the stemming mechanism, Fig. 9 being a vertical section on the line 9 9 of Fig. 10 and Fig. 10 being a side elevation. Fig. 11 is a detail view in perspective of one of the adjustable brackets which support the feed-aprons. Figs. 12 and 13 are detail views in perspective of another one of the brackets for supporting the feed-aprons. Figs. 14 and 15 are detail views of one of the guards used in connection with the stemming-rolls. Fig. 16 is a detail view showing the manner in which the stem-drawing rolls are yieldingly supported.

The main frame A, which is supported by the standards A′, may be of any construction suitable to support the mechanism. In suitable bearings *a* in the frame is mounted a horizontal shaft B, carrying a belt-pulley C, provided with a clutch *c*. On each end of the shaft is a sprocket-pulley E E′, and near one end next the pulley E the shaft carries a pinion *e*, which meshes with a large spur-wheel F on a short shaft *f*, mounted in bearings in a bracket *f*′, secured to the top of the main frame. The shaft *f* carries at its inner end a bevel-pinion *g*, meshing with a continuous series of teeth *g*′ on the under side of a ring or annular carrier G, supported by wheels H, mounted in brackets *h*, attached to the top of the main frame. The arrangement is such that the carrier G is held in a horizontal position by the wheels and guided thereby, so as to revolve freely when actuated by the pinion *g*. The wheels H are preferably flanged, as shown, and have inclined peripheries corresponding with the annular surface *g*² on the under side of the carrier. The upper edge of the ring G is formed with an annular series of teeth *g*³ for a purpose hereinafter described.

In the drawings I have shown two sets of mechanism for feeding the tobacco-leaves and for removing the stems therefrom. The mechanism at each end of the machine is of precisely the same construction, and a description of one set of mechanism will be deemed sufficient.

The unstemmed leaves are piled in troughs I, formed with or secured to the main frame. The leaves are fed to the stemming mechanism at either end of the machine by endless carriers or feed-aprons. Each set of aprons comprises two endless belts or aprons J J′, the apron J traversing two rollers *j* *j*′, while the apron J′ traverses the rollers *j*² *j*³ *j*⁴ and also passes over the roller *j*. Preferably the rollers are arranged in the manner shown in Fig. 3, the aprons traveling in the directions indicated by the arrows. The apron J′, it will be observed, is in contact with the apron J for about half its length on its upper side, and it is also in contact with it on its under side.

The tobacco-leaves are laid by hand on the apron J at *x* (see Fig. 1) and travel with the apron toward the roller *j*, being pressed between the aprons J J′, where the aprons overlap on the upper side of the apron J.

Motion is imparted to the aprons in the following manner: A bracket K (shown in Figs. 9 and 10) is attached to the top of the frame A at the point marked Z in Fig. 1. This bracket has a vertical part *k* and a shorter parallel vertical part *k*′. Between the parts *k* and *k*′ is arranged a pinion *k*² on a shaft *k*³, which has bearings in the parts *k* and *k*′. Just above the pinion *k*² is another pinion *k*⁶, secured to a shaft *k*⁴, having bearings in the vertical portions of the bracket above referred to. The pinion *k*⁶ meshes with the pinion *k*², and it is formed in one piece with another pinion *k*⁵, which meshes with the teeth *g*′ of the annular carrier G. The pinions *k*², *k*⁵, and *k*⁶ are fast on their shafts, and the shaft *k*⁴ is connected by a universal joint *k*⁷ with a shaft L, mounted in bearings below the carrier-aprons J J′ and carrying a sprocket-pulley *l*, which receives a sprocket-chain L′, gearing with a sprocket-chain L² on the shaft of the roller *j*′. Motion is imparted to the shaft L by the gearing shown in Fig. 9, and motion is communicated from the shaft L to the roller *j*′, and it is communicated to the aprons J J′ in an obvious manner—*i. e.*, as the roller *j*′ is revolved the apron J is moved, and as the apron J is in contact with the apron J′ the latter is correspondingly moved. The trunnions of the rollers *j*′ *j*⁴ are mounted in bearings in stationary brackets Q, secured to the main frame near the trough I. The trunnions of the roller *j*² are mounted in bearings in a stationary bracket Q⁴, projecting from an upright bracket Q², secured to the main frame. The trunnions of the roller *j*³ are mounted in bearings in upwardly-projecting arms of a bracket Q³, adapted to slide on the main frame and adjustable therein by means of hand-wheels *q*, having screw-shanks *q*′, engaging lugs *q*² on the bracket and extending through openings in lugs *q*⁸ on the main frame. The bracket has a slotted base through which extend guide-bolts *q*⁷. The roller *j* is carried by a bracket Q′, sliding in ways in the bracket Q² and attached thereto by bolts *q*⁴, passing through slots *q*⁵ in the bracket Q². The bracket Q′ may be adjusted by a hand-wheel *q*⁶, having a screw-shank bearing against a lug *q*⁹ on said bracket and extending through a screw-threaded opening in a lug *q*¹⁰ on the bracket Q².

The bearings for the trunnions of the several rollers are open, and by properly adjusting the hand-wheels the desired tension may be given to the aprons, and consequently the desired pressure on the leaves passing between the aprons may be obtained.

Referring again to Figs. 9 and 10, it will be observed that a sprocket-wheel *m* is secured to the shaft *k*³, and this wheel is connected, by means of a chain *m*′, with a sprocket-wheel *m*² on a shaft *m*³, mounted in bearings in the upper end of the bracket K. This

shaft has secured to its opposite end a grooved pulley M, around which extends an endless band N, which also extends around a grooved pulley N′, secured to a shaft n, mounted in bearings in a sliding bracket N^2. The band is arranged to travel in an annular recess n^2 in the periphery of the carrier G outside the series of teeth g^3. The bracket N^2 extends horizontally through a guide n^3 in the bracket K, the latter being slotted at n^4, while a bolt n^5, passing through the slot, connects the brackets N^2 and K, but permits the former to slide horizontally in the latter. A hand-wheel O, having a screw-shank passing through a nut in the bracket K, bears against the bracket N^2, and by means of it this bracket may be given the desired adjustment to vary the tension of the band N. An idle pulley O′, mounted in bearings in a bracket o, rising from the bracket K, engages the band N and directs its course in the manner indicated in Fig. 1.

P indicates a rotary cutting-disk attached to a horizontal shaft p, mounted in bearings in the bracket N^2 and geared to the shaft n in the manner clearly shown in Figs. 1 and 10.

The stemming or stripping rolls R R′ are arranged one above the other with parallel axes and revolve in bearings in a bracket S, secured to the main frame A in the manner indicated in Fig. 2. These rolls are geared with each other by cog-wheels s, and a cog-wheel s' on one of the rolls gears with a corresponding wheel t on one of the stem-drawing or traction rolls T T′, which latter are also mounted in bearings in the bracket S and are geared together by toothed wheels t' in the manner indicated. At one end of the machine the sprocket-pulley E is geared with one of the rolls T T′ by a chain t^2. At the opposite end of the machine the sprocket-pulley E′ is geared by a chain t^3 to one of the stemming-rolls R R′. The purpose of this change in gearing is to cause the rolls to revolve in proper directions relatively to the direction of rotation of the annular carrier G.

The stem-drawing or traction rolls T T′ are shown on an enlarged scale in Fig. 6. For the most part they are plane and cylindrical, with their peripheries held yieldingly in contact with each other by springs U, mounted in frames u and pressing on the lower bearings of the bottom roll T′. The ends of both rolls next the feed mechanism are tapered abruptly for the purpose of guiding the stems into position between them, and the upper roll T is threaded at the inner end of the tapered portion for the purpose of feeding the stems into the bite of the rolls, insuring that they shall take a proper hold thereon. The stem-drawing rolls may be slightly roughened to insure their taking a firm hold on the stems.

The stemming-rolls R R′ (shown on an enlarged scale in Fig. 5) revolve about parallel axes, and their ends next the feed mechanism are tapered abruptly at r in order that the leaves may be directed properly into engagement with the rolls. From the inner ends of the tapered portions r the rolls are tapered gradually toward their opposite ends, thus forming a space between them which gradually increases in width from the ends r inward. Each roll is threaded, preferably, by being provided with a spiral rib r^2, which extends from the end r to the opposite end of the roll.

The edges of the threads on one roll are preferably arranged close to the edges of the threads of the other roll. The threads on the entrance end of each roll next the portion r and for about half the length of the roll are somewhat finer—that is, the spirals are closer together than at the opposite or exit end of the roll. By this arrangement of the threads of the two rolls a continuous spiral channel is formed between the rolls. Preferably two separate threads or spiral ribs are used on each roll, one thread extending substantially the entire length of the roll, while the other thread extends about half the length of the roll and is wound between the convolutions of the other thread.

The threads on the two rolls gradually increase in depth, as indicated in Fig. 5, and the longitudinal space between the rolls is divided by the spirals into a series of openings which gradually increase in area from the entrance ends of the rolls to the opposite ends thereof for the purpose of accommodating the gradually-increasing diameter of the stem. The tobacco is prevented from winding around the stemming-rolls by suitably-placed guards W W′ of suitable construction. These guards, as shown, each consists of a plate w, secured to a rod w', the end of which is held in a socket in a lug of the bracket S by a set-screw w^2. By turning the rod about its axis the position of the guard relatively to the stemming-rolls may be adjusted. Ordinarily there is no necessity for these guards; but occasionally a piece of the leaf will tend to wrap around the rolls, but these guards prevent it.

In operation the tobacco-leaves are laid one at a time on the apron J, as indicated in Fig. 1, with the tip of the leaf overlapping the toothed carrier G. In Fig. 1 the leaf is shown as having been flattened out; but this is not necessary. Ordinarily the leaves as they come to the machine have their wings folded or bunched around the stems. It is not necessary that this arrangement should be disturbed. The stems, while for the most part nearly straight, are often curved or bent slightly; but this is not material, as the curvature is gradual, and when a leaf gets started through the stemming mechanism the stem will be straightened out automatically sufficiently to cause it to pass through the mechanism without being cut or broken. The leaves should of course be in what is technically called proper "order"—*i. e.*, they should be some-

what soft or moist and not dry or brittle. The aprons carry the leaves sidewise toward the stemming mechanism. The tip of each leaf is first engaged by the band N, which presses the leaf against the periphery of the annular carrier, and then that portion of the leaf in rear of the tip is directed into engagement with the stemming-rolls R R′. These rolls revolve in the direction indicated by the arrows and tend to force the leaf backward away from the carrier G; but as the stem passes freely between the spirals and is held firmly by the carrier G and by the band N the stem instead of being forced backward is drawn forward, while the portions of the leaf with which the stemming-rolls engage on opposite sides of the stem are separated therefrom and piled up on that side of the stemming-rolls next the feed-aprons. As the leaf is moved farther on by the aprons J J′, the carrier G, and the band N it will move into engagement with the stem-drawing rolls T T′, which revolve in the direction indicated by the arrows—*i. e.*, in an opposite direction to that of the stemming-rolls R R′—and tend to draw the leaf forward, while the stemming-rolls tend to force it backward or retard its forward movement. The stem, however, is not pushed backward by the stemming-rolls, because it is loosely arranged in the openings between them. The effect of this organization is to draw the stems forward while the leaf is being fed laterally or sidewise by the aprons, and the wings of the leaf on opposite sides of the stem are forced backward or held back and are stripped from the stem, piling up on that side of the stemming-rolls next the feed-aprons. As the leaf is being fed sidewise the stem moves transversely freely between the stemming-rolls—in fact, being fed laterally at the proper speed by the spirals on these rolls. Before the leaf has reached the inner ends of the stemming-rolls the wings are entirely removed from the stem, the latter falling onto the floor or into a suitable receptacle after passing through the drawing-rolls. Just after the wings have been separated from the stem the tip is severed from the stem by the cutter P. The tip being all good tobacco (the stem which it contains being small, soft, and pliable) falls onto the floor or into a suitable receptacle and the wings falling onto the floor or into a receptacle below the stemming-rolls. The stem-drawing rolls revolve at a high rate of speed, and when they once fairly engage the stems quickly withdraw them from the wings of the leaves and discharge them into a pile onto the floor or into a suitable receptacle.

In the stemming of tobacco-leaves it sometimes happens that a leaf with a broken stem will be encountered, or a leaf with some unusual formation may be presented to the stemming mechanism, or the attendant may now and then supply the leaves carelessly, so that the stemming mechanism will not receive and act upon it in the usual way. When this happens, the leaf is carried by the aprons past the stemming mechanism, and the leaf follows the aprons around the roller *j* and passes back with the aprons and is deposited at the point marked *y* into the trough I, from which it may be again taken and presented to the machine with proper care. It is of course possible to omit the feed-aprons and to present the leaves directly to the stemming-rolls; but I prefer to employ feed-aprons of the kind illustrated and arranged to coöperate with the other mechanism in the manner described.

The stems at the outer ends of the tipless leaves being comparatively thin, the fine threads on the stemming-rolls are sufficiently open to allow the stems to pass freely through them and to cause the wings of the leaves to be stripped close to the stems, while the latter are grasped by the carrier G and band N. The coarse threads on the stemming-rolls accommodate the thicker portions of the stems, while the stems are grasped by the stem-drawing rolls.

The construction of the stemming-rolls is such that undue crowding of the leaves against them is avoided, as would be the case if the stems passed straight through them. Furthermore, the stems are fed positively laterally by the spirals coincidently with the lateral feed given to the leaves by the feed-aprons.

Without the use of spirals or their equivalents there would be a tendency of the stems being unduly bent, because the aprons would tend to feed the parts of the leaves held by them faster sidewise than the parts of the leaves engaged by the stemming mechanism. The aprons grasp the leaves with sufficient firmness to cause them to be fed laterally at the proper speed; but they yield sufficiently to allow the leaves to be drawn through them as the operation progresses. The aprons allow the leaves to move freely when a sudden pull is given to the stems.

While I prefer to commence the operation of stemming at the outer end of the leaf, I consider as within the scope of my invention such modifications of the mechanism as are necessary to operate on the leaves from the opposite ends.

I have described my invention as embodied in a machine which I have found in practice to be most efficient, and such mechanism contains my improvements organized in the way now best known to me. I would say, however, that the same or substantially the same results may be obtained if the details of construction are changed, and the mechanism may be modified within certain limits without departing from my invention.

There are many well-known equivalents for much of the mechanism shown and described, and equivalents for some of the mechanism which is entirely novel with me will occur to

those skilled in the art. I therefore do not limit myself to the specific mechanism shown, but desire to include as within my invention equivalents performing the same functions.

I claim—

1. In a leaf-stemming machine the combination with stemming mechanism of means for feeding leaves thereto, and supplemental means for reversing the movement of broken or unstemmed leaves and moving them toward the point where they were first delivered to the machine.

2. In a leaf-stemming machine, the combination with stemming mechanism, of overlapping feed-aprons between which the leaves are fed toward the stemming mechanism, and which after passing the stemming mechanism return and feed broken or unstemmed leaves in a reversed direction away from the stemming mechanism.

3. In a leaf-stemming machine, the combination with stemming mechanism, of two feed-aprons having overlapping portions which move toward the stemming mechanism and carry the leaves thereto, and also have overlapping portions which commence to move in a reverse direction after leaving the stemming mechanism and carry the leaves away from said stemming mechanism.

4. In a leaf-stemming machine, the combination with stemming mechanism, of a feed-apron having an upper portion moving toward the stemming mechanism, and a lower portion moving away from it in a reverse direction, and another apron overlapping a portion of the top of the first-mentioned apron and running in the same direction therewith, and another portion which runs in close contact with the under portion of said first-mentioned apron, and rollers for supporting said aprons arranged on opposite sides of the stemming mechanism, for the purpose specified.

5. The combination with the stemming mechanism, of an annular toothed carrier revolving in a plane parallel with the stemming mechanism and which carries the leaves into engagement therewith.

6. The combination with the stemming mechanism, of an annular carrier and a band engaging therewith, and between which and the carrier the leaf is held while being fed to the stemming mechanism.

7. The combination with the stemming mechanism, of an annular carrier, a band engaging it and between which and the carrier a leaf is grasped, the stemming mechanism and a cutter for severing one portion of the leaf from the other portion thereof after the leaf has been engaged by the stemming mechanism.

8. The combination with stem-drawing rolls, of means for feeding the leaves into engagement therewith, a cutter which severs the tip of the leaf from the other portion thereof while engaged by the stemming-rolls, and stem-drawing rolls which draw the stems between them and discharge them after the tip has been severed.

9. The combination with means for feeding the leaves, of two stemming-rolls each of which is spirally threaded and which have a space between them divided by the spirals into a series of separate openings, and means for drawing the stems successively through these openings.

10. The combination with means for feeding the leaves, of two tapered spirally-threaded rolls revolving about parallel axes and having a space between them divided by the spirals into a series of openings and means for drawing the stems successively through these openings.

11. The combination with means for feeding a leaf, of the stemming-rolls spirally threaded and having a tapered opening at their entrance ends and revolving about parallel axes.

12. The combination with means for feeding a leaf, of stemming-rolls tapered at their entrance ends and gradually tapering toward their exit ends, spiral threads on the rolls gradually increasing in depth toward the exit ends of the rolls, and stem-drawing rolls which draw the stem of a leaf successively through the spaces between the spirals.

13. The combination with the stemming-rolls, of the stem-drawing rolls having tapered entrance ends and one of which has a threaded portion at its entrance end.

14. The combination with the annular toothed carrier and means for holding a leaf in engagement therewith, of the spirally-threaded stemming-rolls, and the stem-drawing rolls whose entrance ends are arranged in rear of the entrance ends of the stemming-rolls.

15. The combination with means for feeding the leaves sidewise, of stemming-rolls with a longitudinal space between them to allow the stems to move sidewise, transverse ribs on the rolls having spaces between them to allow the stems to pass through the rolls, and means for drawing the stems through the rolls, substantially as described.

16. The combination with stemming mechanism comprising spirally-threaded rolls and stem-drawing rolls, of a horizontally-arranged annular carrier, a band engaging therewith and between which and the carrier the leaf is held while being fed to the stemming mechanism, and endless feed-aprons arranged on horizontal rollers and adapted to feed the leaves toward the stemming mechanism and also at times to feed unstemmed leaves away from it.

17. The combination with stemming mechanism comprising spirally-threaded rolls and stem-drawing rolls, of a horizontally-arranged annular toothed carrier, a band engaging therewith and between which and the carrier the tip of the leaf is held while being fed to the stemming mechanism, a cutter for sever-

ing the tip from the body of the leaf, an endless feed-apron arranged on horizontal rollers and adapted to receive the leaf on its upper surface, and to feed the leaf into engagement with the toothed carrier and the band, and also into engagement with the stemming mechanism, another overlapping feed-apron coöperating with that first mentioned to feed the leaves to the stemming mechanism, and means for adjusting the tension of the aprons.

In testimony whereof I have hereunto subscribed my name.

WILLIAM C. BRIGGS.

Witnesses:

THOMAS S. BRIDGHAM,

ROLAND O. BRIGGS.