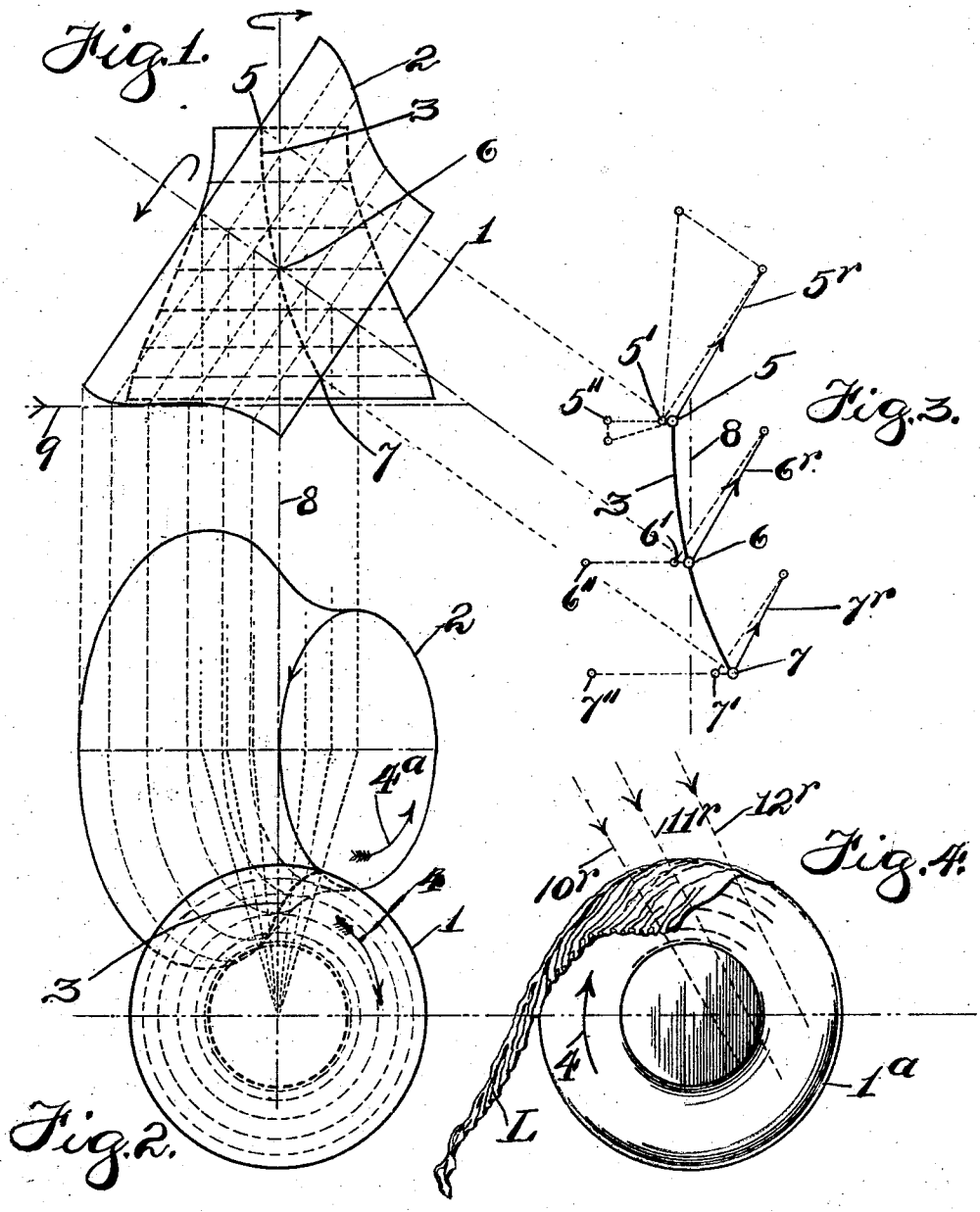
No. 853,511. PATENTED MAY 14, 1907.

C. F. HALL.

ART OF STRIPPING TOBACCO.

APPLICATION FILED JULY 9, 1904.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 5

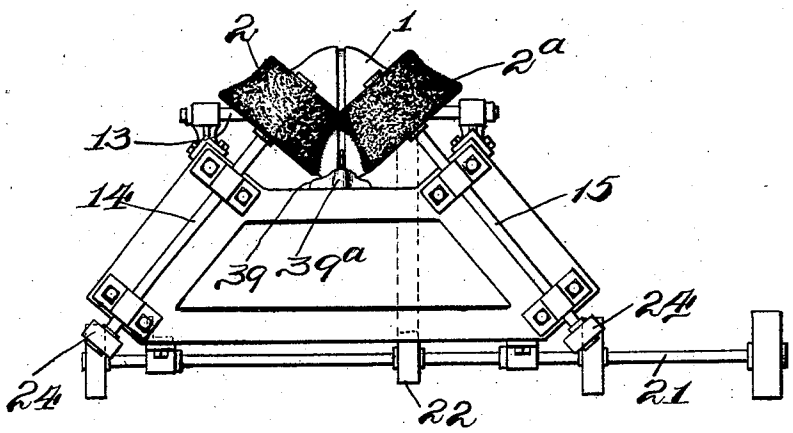
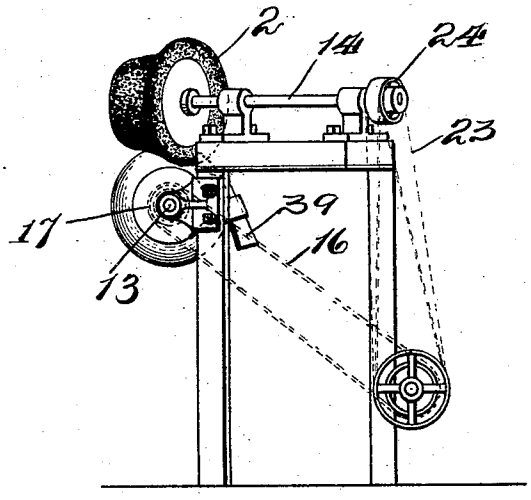


Fig. 6.



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4 SHEETS—SHEET 3.

Fig. 7.

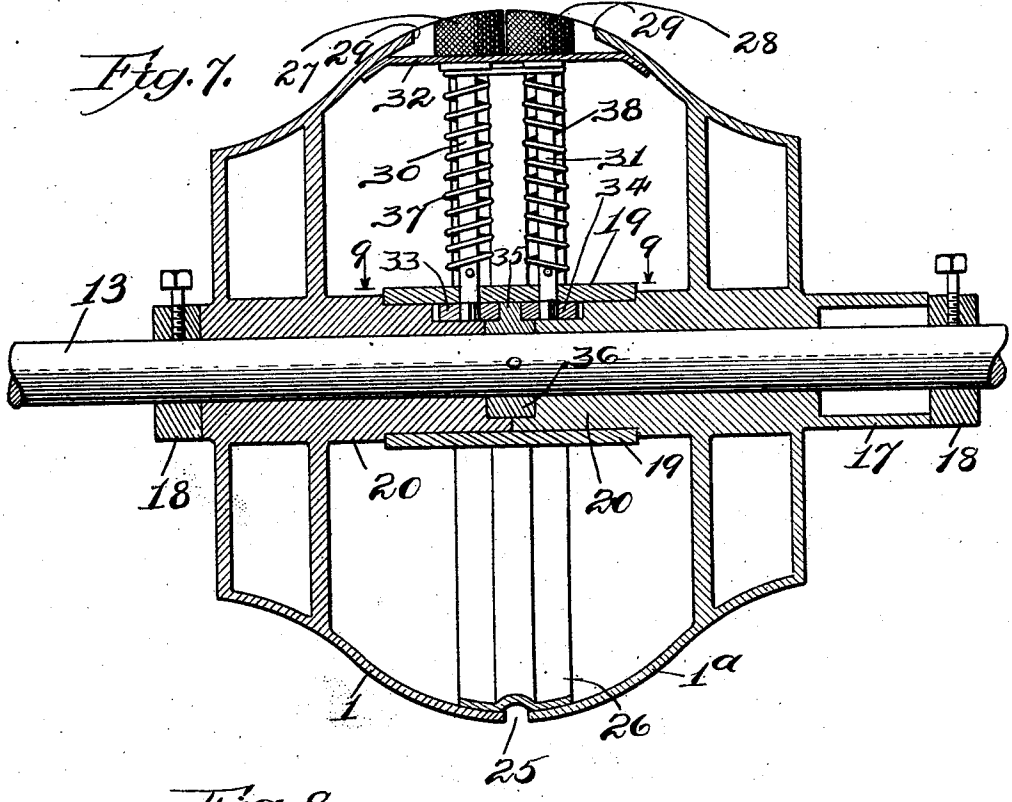


Fig. 8

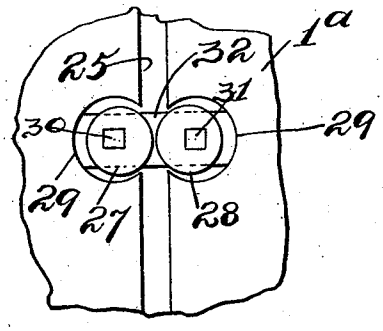
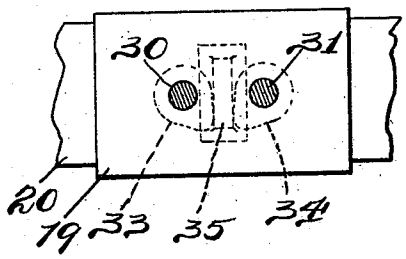


Fig. 9.



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ART OF STRIPPING TOBACCO.

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4 SHEETS—SHEET 4.

Fig. 10.

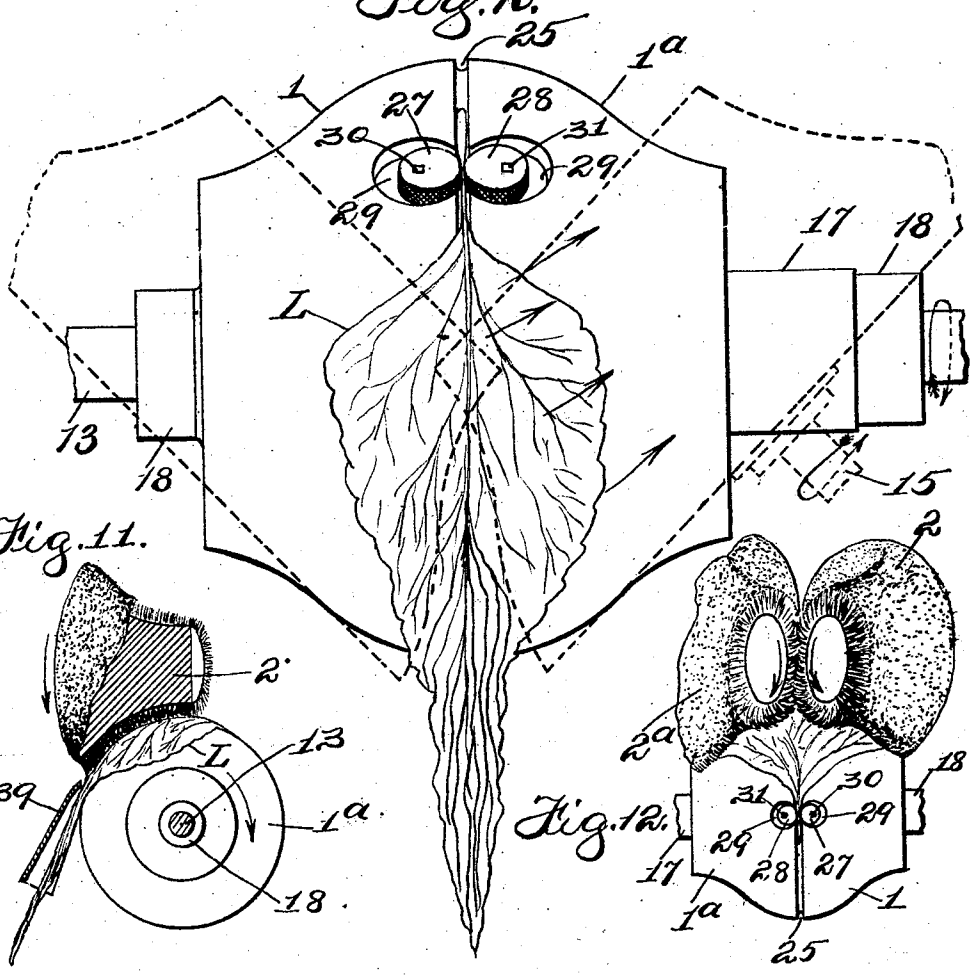
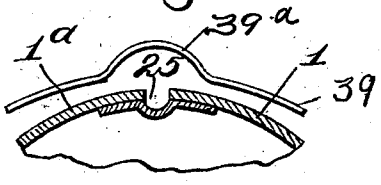


Fig. 11.

Fig. 12.

Fig. 13.



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UNITED STATES PATENT OFFICE.

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ART OF STRIPPING TOBACCO.

No. 853,511. Specification of Letters Patent. Patented May 14, 1907.

Application filed July 9, 1904. Serial No. 215,871.

To all whom it may concern:

Be it known that I, CHARLES F. HALL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Art of Stripping Tobacco, of which the following is a full, clear, and exact specification.

My invention relates to the art of stripping tobacco and has especial reference to smoothing the wrinkles out of the leaf preparatory to the operation by which the web of the leaf is stripped from the stem.

The object of the invention is to stroke the leaf cross-wise of the crease or wrinkle while the leaf is held in a form convex on one side and concave on the other so that the leaf will be restored to its natural shape.

The tobacco leaf while growing or standing in the field assumes a form which is curved from top to bottom of the stem, that is, curved longitudinally of the stem and also transversely of the stem as a result of the drooping tendency due to the weight of the leaf as a whole, and to the weight of the web which droops downwardly from both sides of the stem. When the leaf is gathered and hung up to be cured its position is reversed, the point being turned downwardly, and consequently the web is wrinkled or creased with minute creases extending parallel with or lengthwise of the stem, causing the web of the leaf to close together with the stem in a manner which might be compared to the folding of a fan. Preparatory to stripping the web from the stem, the leaf is moistened to prevent it from tearing and the wrinkles are smoothed out, usually by hand, but it will be found that if the leaf which was originally concavo convex be laid upon a flat or non-spherical surface during the smoothing operation, the effect of the smoothing operation will not be uniform, and the very act of attempting to smooth out the wrinkles while thus held will cause the web to buckle, and assume more wrinkles and in many instances to tear. Therefore, in accordance with my invention I perform the smoothing operation while the leaf is held in the form which it assumes in nature, namely, convex on one side and concave on the other. This may be accomplished by means of a suitable forming member or mandrel over which the web may be cupped. The act of stretching the leaf over this mandrel of course necessitates the smoothing out of the wrinkles, and in order to accomplish this, I stroke the leaf in a direction cross-wise of the wrinkles and at an oblique angle to the stem, but it is obvious that these fan like folds, in order to be unfolded or smoothed out, must be uniformly rotated in an arc taking for its center the point where the fold adjoins the stem and for its radius the outer end of the fold or perimeter of the leaf, and consequently this smoothing motion must be less at the inner end of the fold than it is at the outer end, otherwise the web might be torn loose from the stem. Consequently, the power applied for this purpose is applied in lines of forces which tend to converge. This result may be best accomplished by the form of apparatus which I have shown in the accompanying drawings, and which comprises the mandrel or forming member having a part of its surface ovate or convex in form, that is, a member which is curved in cross-section and also in longitudinal section, and in combination with this member a brush which is of complementary formation arranged contiguous to the surface of said member and the two rotated in the same general direction at their line of contact, but one on an axis at an oblique angle to the axis about which the other is generated.

In the said drawings,—Figure 1 is a geometric illustration of the said brush and mandrel or forming member showing the same in plan. Fig. 2 is a similar illustration showing the same in side elevation and as developed from the diagram in Fig. 1. Fig. 3 is a diagram developed from Fig. 1 showing the resultant forces of the brush and the cone or mandrel on the leaf. Fig. 4 is a diagram showing the leaf cupped over the cone or forming member and illustrating also the lines of force which act upon the folds, the cone shown in this figure being the opposite or companion cone to the one shown in Fig. 1. Fig. 5 is a plan view of the machine. Fig. 6 is a side elevation. Fig. 7 is an enlarged detail sectional view of the mandrel or forming member. Fig. 8 is a detail plan view of the grip or clutch. Fig. 9 is a detail sectional view on the line 9—9, Fig. 7. Fig. 10 is an enlarged plan view of the cone or mandrel showing a leaf passing over it, the

brushes being dotted. Fig. 11 is a view on a smaller scale showing the parts in side elevation. Fig. 12 is an elevation looking toward the discharge side of the machine, and Fig. 13 is a detail cross-section of the guide.

The invention will probably be best understood if considered first in connection with the diagrammatic illustrations in Figs. 1 to 4, inclusive, in which 1 is the cone, mandrel or forming member over which the leaf is cupped or spread while the wrinkles are being smoothed out, and 2, is the brush which is arranged contiguous to the periphery of the cone for smoothing the wrinkles out of the leaf and is in contact with the cone along a curved line 3. The direction and curvature of this line is determined by the fold in the leaf and may vary slightly to suit various grades and sizes of leaves. The cone or member 1, as before mentioned, is round or curved in cross-section and also in longitudinal section, that is, it is of varying diameter from end to end cross-wise of its longitudinal axis, and it is preferably generated by an ogee or double curve rotated about said axis. It being important that the brush have perfect contact with the surface of the cone along a continuous line longitudinal of the cone, it naturally follows that the brush is of complementary or corresponding shape, but the cone and brush are turned end for end with respect to each other, the attenuated end of one being contiguous to the larger end of the other, and the brush is arranged with its axis of rotation at an oblique angle to the plane of the cross-section of the cone, that is, at an oblique angle to the longitudinal axis of the cone. Both the cone and the brush are rotated in the same direction at their line of contact so that they will move in a complementary direction at that point, or, in other words, roll together, but for reasons to be hereinafter pointed out, they are rotated at differential speeds. The direction of rotation of the cone is indicated in the diagrams by the arrow 4, and that of the brush by arrow 4^a. The surface of the cone is preferably polished and is of a form best suited to the spreading of the leaf, and the brush is provided with bristles of suitable flexibility for imparting motion to the web of the leaf and unfolding it without tearing it after the manner, as before mentioned, of unfolding a fan.

The relative motion of the cone to the brush is determined by three elements: first, the angular velocities of the cone and the brush, second, the relative lengths of the radii taken at the points on the contact of the surfaces of the two rotating bodies; and, third, the angles between the directions of motions of the two surfaces at the same points. The angular velocity of the cone is constant for every section in a plane perpendicular to the axis of rotation. Similarly, the angular velocity is constant in the brush, and therefore the relative angular velocity of the cone to the brush is constant, and may be determined by experiment. For illustration, it may be assumed that this relative angular velocity has a ratio of 1 to 10; that is, that the cone has one revolution to ten revolutions of the brush. Therefore, it is necessary to determine the radii of the cone and brush at points along their line of contact 3, which when combined with the constant ratio of angular velocities, gives the resultant linear velocity ratios and these, together with the angles between the directions of motions of the surfaces at different points, give the directions of the motion transmitted to the leaf. In Fig. 3, I have represented, geometrically, this resultant motion which is given to the folds or wrinkles in the leaf, and as before mentioned, is due to the relative surface speeds of the cone and brush. The line of contact 3, is projected from Fig. 1 upon a horizontal plane parallel to the plan view of Fig. 1, and is also projected diagonally outward in line with the axis of rotation of the brush. Points 5, 6 and 7, in Fig. 3, are the same as points 5, 6 and 7 of Fig. 1. Inasmuch as the forces of both the brush and cone are in direct proportion to the radii, it is only necessary to project values of these radii geometrically to the plane of Fig. 3 with allowance for the angular velocity ratio in order to obtain the relative values of direction and resultant of motions centering at the points of contact considered with reference to the plane of the figure. The dotted line 8 in this figure represents the longitudinal axis of the cone, and in combination with the lines 5^R, 6^R and 7^R shows the angular direction of motion given to the folds or wrinkles of the leaf by the combined rotation of the brush and cone. This angular direction of motion varies at various points along the line of contact 3, lines 7^R and 8 forming an angle of less degree than that formed by lines 8 and 5^R. Points 5′, 6′ and 7′ in combination with points 5″, 6″, 7″ and points 5, 6, 7, respectively, denote the constant angular velocities of the brush and cone, which, for illustration, are 1 to 10. It will be observed that if this constant is altered to 1 to 2, for example, the points 5′, 6′ and 7′, approach nearer to points 5″, 6″ and 7″, respectively, and therefore will cause the resultants 5^R, 6^R and 7^R to change their angle of direction, so that 5^R may be nearly parallel with axis 8; similarly 6^R and 7^R may be even brought around to an acute angle with axis 8 in the opposite quadrant, and moreover, it will be seen that to obtain a suitable direction of relative motion to the leaf, it is only necessary to correctly adjust the ratio of rotation of cone to brush. It will be noted that the lines of force, or motion, 5^R, 6^R and 7^R converge more or less, and it will also be noted

that the lines 5^R, 6^R, 7^R indicate varying velocities increasing from the line 7^R and hence it is apparent that since the stem of the leaf is contiguous to the line 7^R, and the perimeter thereof contiguous to the line 5^R, greater smoothing velocity is imparted to the outer end of the fold of the leaf, than to the inner end where it pivots, as it were, when being unfolded from a position parallel or substantially parallel with the line 9, which may indicate the direction of travel and the center or stem of the leaf, and this action, of course, is in conformity with the requirements and the conditions since it is apparent that it requires greater motion at the outer end of the fold than it does at the inner end, and that the motion throughout the length of the fold should be approximately proportionate to the revolving motion of the fold at every point throughout its length.

In Fig. 4 of the drawing is shown a leaf marked "L" supported on the cone or mandrel marked "1^a", which is the companion of the cone 1, and which is employed on a coincident axis with cone 1 in the practice of the invention for commercial purposes, as will be hereafter described. The lines 10^R, 11^R and 12^R in this figure indicate the downwardly direction, respectively, of the resultants 5^R, 6^R and 7^R whose lateral deflection is shown in Fig. 3, and it will also be observed that these lines are very nearly normal to the fold or wrinkle of the leaf, and it will also be understood that the web of the leaf will be impelled with greater velocity along the line 10^R, which is contiguous to the outer edge of the leaf, than along the line 12^R, because 10^R corresponds to 5^R, which has greater value than 7^R, which corresponds to 12^R, 12^R being adjacent to the stem of the leaf. In practice, it is preferable to employ two of such cones as $1, 1^a$, arranged with their larger ends contiguous on a shaft 13, and two of the brushes 2, 2^a arranged on converging shafts 14, 15, respectively, so that the web of the leaf may be smoothed or acted upon on both sides of the stem simultaneously. The desired speed may be imparted to the cones by any suitable means, as a belt 16, running over pulley 17, formed on one of the cones, which are shown in Fig. 7, as connected together and journaled loosely upon shaft 13, between retaining collars 18, the connection between the cones being a sleeve 19 embracing the hubs 20 formed on the cones respectively, or any other suitable means may be employed, it being immaterial whether the cones are formed in one piece or in two halves so far as the principle of operation is concerned. The belt 16, derives motion from a driving shaft 21, and a pulley 22 thereon, and this shaft also imparts motion by belts 23 to pulley 24 on shafts 14, 15, respectively, whereby the brushes will be driven in opposite directions with respect to each other, but in a direction complementary to the direction of rotation of the cones.

The axes of the brushes are arranged at an angle to each other, and also at an angle to the axis of rotation of the cones with the bristles of the brushes intermeshing with each other as indicated in Figs. 10 and 12, so that the leaf will be impinged by the bristles at a point as close as possible to the stem of the leaf, and this line of impingement, therefore, will continue outwardly from such stem along the line 3 to the outer edge of the leaf so that at every point the leaf will be struck by the brush, and the fold will be acted upon throughout its entire length.

The leaf is fed into the machine with the butt of the stem foremost and the stem resting in a groove or space 25, which is left or formed between the cones 1, 1^a, the bottom of the groove, if desired, being formed by a grooved band 26, placed within the cones across the space 25. As the leaf is introduced the butt of the stem is caught by any suitable automatic grip or clutch, as two eccentric clutch members 27, 28, having knurled peripheries arranged to roll together and thereby pinch the leaf, these being let into suitable recesses 29, in the periphery of the cones and mounted upon rocker shafts 30, 31, respectively, whose outer ends are journaled in a plate or bar 32, and their inner ends in the sleeve 19. Within this sleeve 19 the shafts 30, 31 are provided with cams 33, 34, respectively, and in the line of travel of the inner or contiguous ends of these cams is fixed a wedging member 35, secured by a collar 36, to the fixed shaft 13, and whose function is to wedge between the ends of the cams and by spreading them apart to rotate the grips 27, 28 away from each other, and thereby cause the latter to release the stem of the leaf. The leaf is gripped by the clutch when the cams 33, 34 pass the end of the wedge 35, by springs 37, 38 secured on the shafts 30, 31, respectively, and tending to rotate them in the direction opposite that in which they are rotated by the wedge 35, and which springs are of sufficient tension to cause the grip members 27, 28 to retain possession of the stem of the leaf until said grip members are positively separated by the engagement of the cams 33, 34 with the wedge 35, which is situated on the collar 36 at the point where the smoothing operation is completed and it is desired to release the leaf.

To facilitate the introduction of the leaf, a guide plate or shield 39, may be employed. This, as better shown in Figs. 11 and 13, is placed over or across the groove 25 and bent downwardly at its outer end and bent upwardly as shown at 39^a to form a passage for the thicker portion or stem of the leaf.

Having thus described my invention, what

I claim as new therein and desire to secure by Letters Patent is:

1. The method of removing wrinkles from tobacco leaves which consists of holding the leaf in a form concave on one side and convex on the other and stroking the same crosswise of the wrinkles while thus held.

2. The method of removing wrinkles from tobacco leaves which consists in holding the leaf in the form it assumes in growing and stroking the same crosswise of the wrinkles.

3. The method of removing wrinkles from tobacco leaves which consists in holding the leaf in a form concave on one side and convex on the other and stroking the same crosswise of the wrinkles in converging lines.

4. The method of removing wrinkles from tobacco leaves which consists in holding the leaf in an ovate form and stroking the same crosswise of the wrinkles while thus held.

5. The method of removing wrinkles from tobacco leaves which consists in holding the leaf in a form concave on one side and convex on the other and stroking the same crosswise of the wrinkles with motion increasing in speed from the stem of the leaf outward toward its perimeter.

6. The method of removing wrinkles from tobacco leaves which consists in holding the leaf in a form concave on one side and convex on the other and stroking the same crosswise of the wrinkles on both sides of the stem simultaneously and in outward directions from the stem.

7. In a machine for the purpose described the combination of a member having a curved periphery in cross-section and having a curved periphery also in longitudinal section, and a rotary brush contacting therewith and being of a form complementary thereto along said line of contact, the axis of the brush being oblique to the longitudinal axis of said member.

8. In a machine for the purpose described, the combination of a member curved in cross-section and of varying degree of curvature from end to end and a rotary brush of complementary form arranged contiguous to the periphery of said member.

9. In a machine for the purpose described, the combination of a member circular in cross-section and of varying length of diameter from end to end, a rotary brush of complementary shape arranged contiguous to the periphery of said member with its smaller end contiguous to the larger end of said member and means for rotating said brush and member in the same general direction at their line of contact.

10. In a machine for the purpose described, the combination of a member of ovate form and a rotary brush contacting therewith and being of a form complementary thereto along a single line of contact.

11. In a machine for the purpose described, the combination of a member curved in cross-section and of varying degree of curvature from end to end with attenuated ends, two rotary brushes of tapering form contacting with said member and having their axes arranged at an angle to each other and also at an angle to the longitudinal axis of said member, and means for rotating said brushes toward the smaller ends of said member respectively.

12. In a machine for the purpose described, the combination of a member curved in cross-section and of varying degree of curvature from end to end and a rotary brush of complementary form having its axis of rotation arranged at an angle to the longitudinal axis about which said curved member is generated.

13. In a machine for the purpose described, the combination of a member curved in cross-section and a longitudinal section having the form of an ogee curve, and a rotary brush arranged contiguous to the periphery of said member with its axis of rotation at an angle to the longitudinal axis of said member.

14. In a machine for the purpose described, the combination of a forming member over which to spread the leaf, means contacting with said member for brushing the wrinkles from the leaf, a guide for directing the leaf between said member and means, and means carried by said member for gripping the leaf.

15. In a machine for the purpose described, the combination of a rotary forming member over which to spread or form the leaf, a rotary brush arranged contiguous to the periphery of said forming member and means for rotating said member and brush at different rates of speed.

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