May 23, 1939. R. E. RUNDELL ET AL 2,159,404

TOBACCO LEAF FEED

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FIG. I

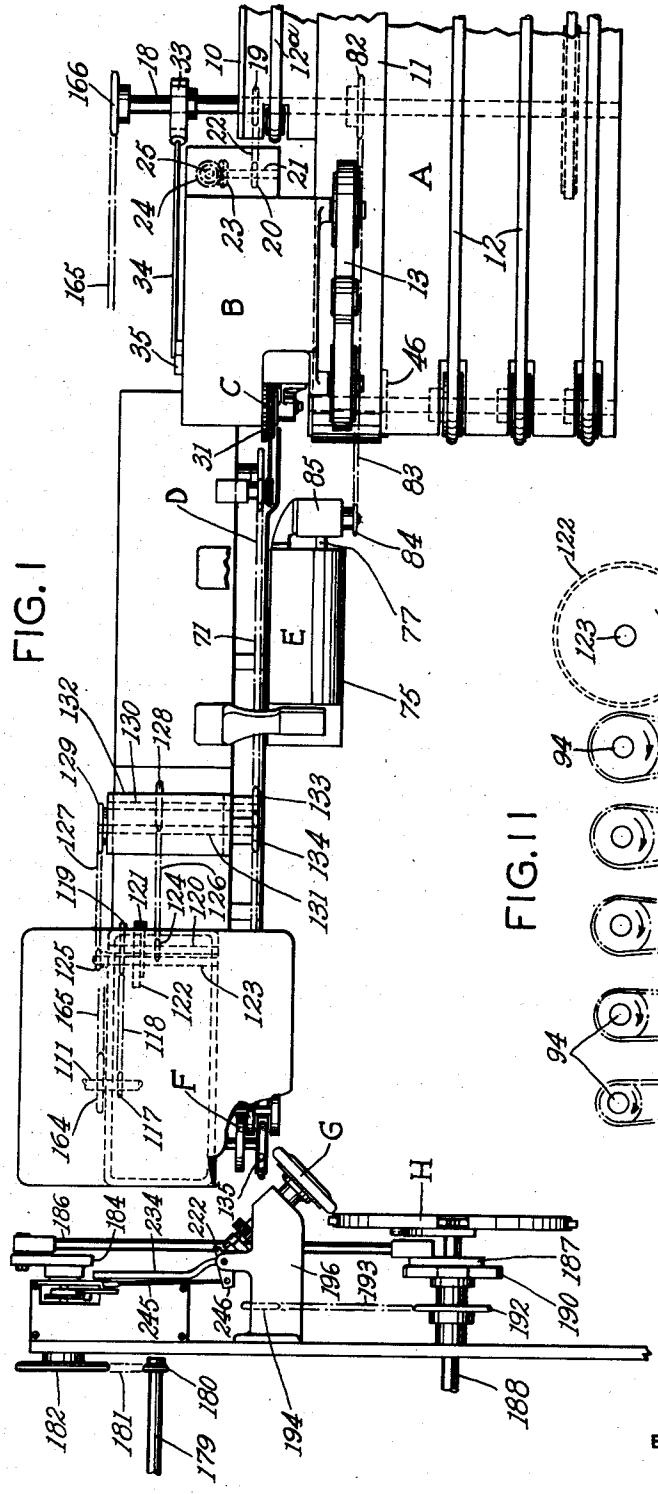
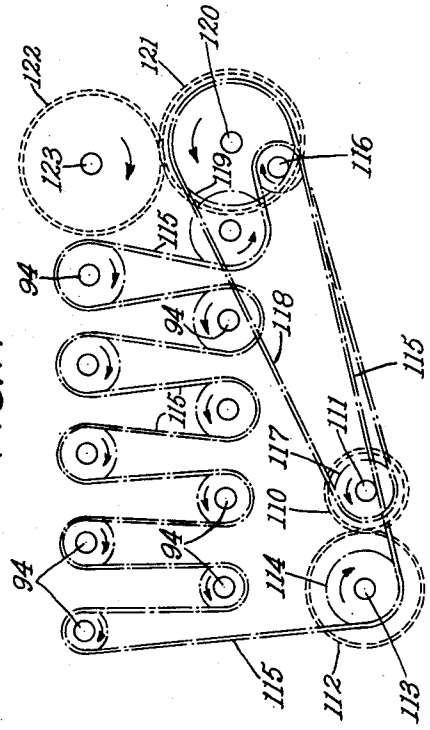


FIG. II



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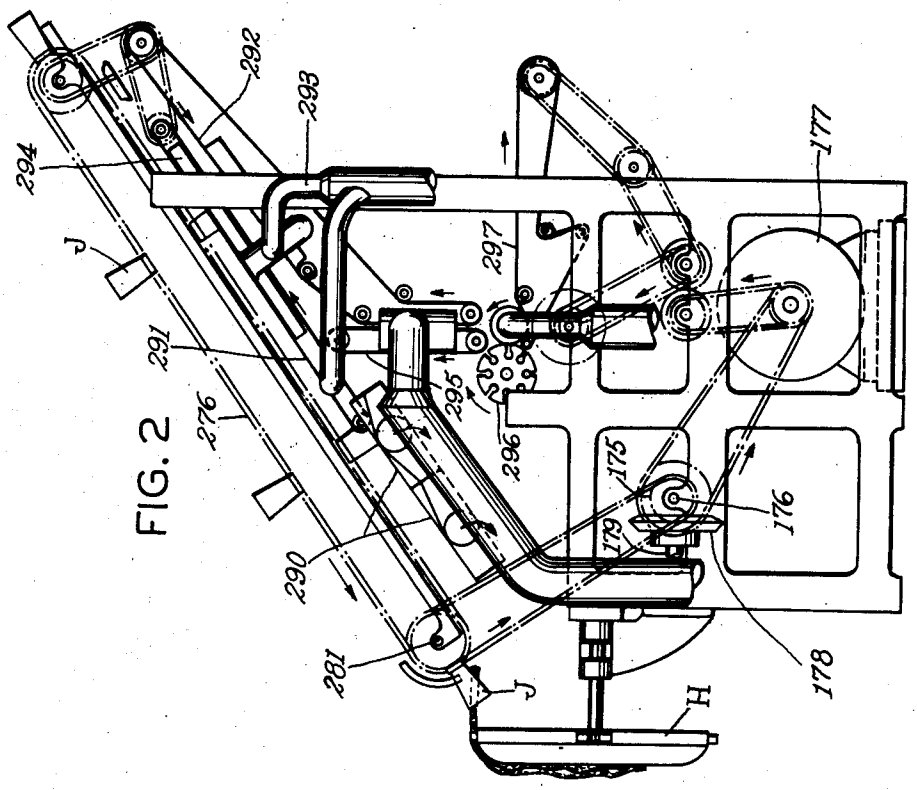

FIG. 2

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FIG. 4

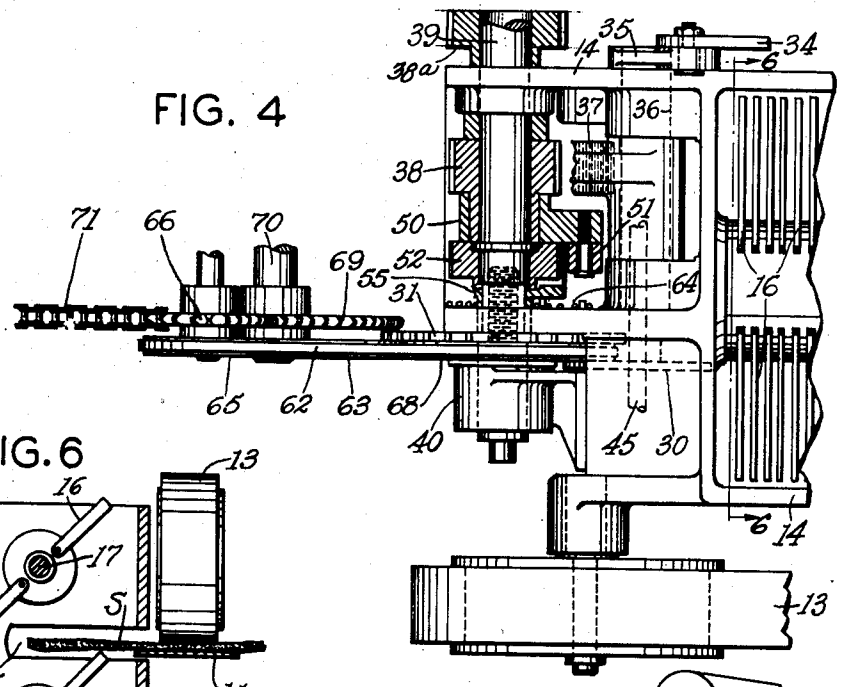

FIG. 6

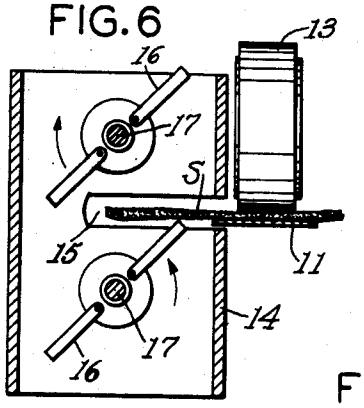

FIG. 3

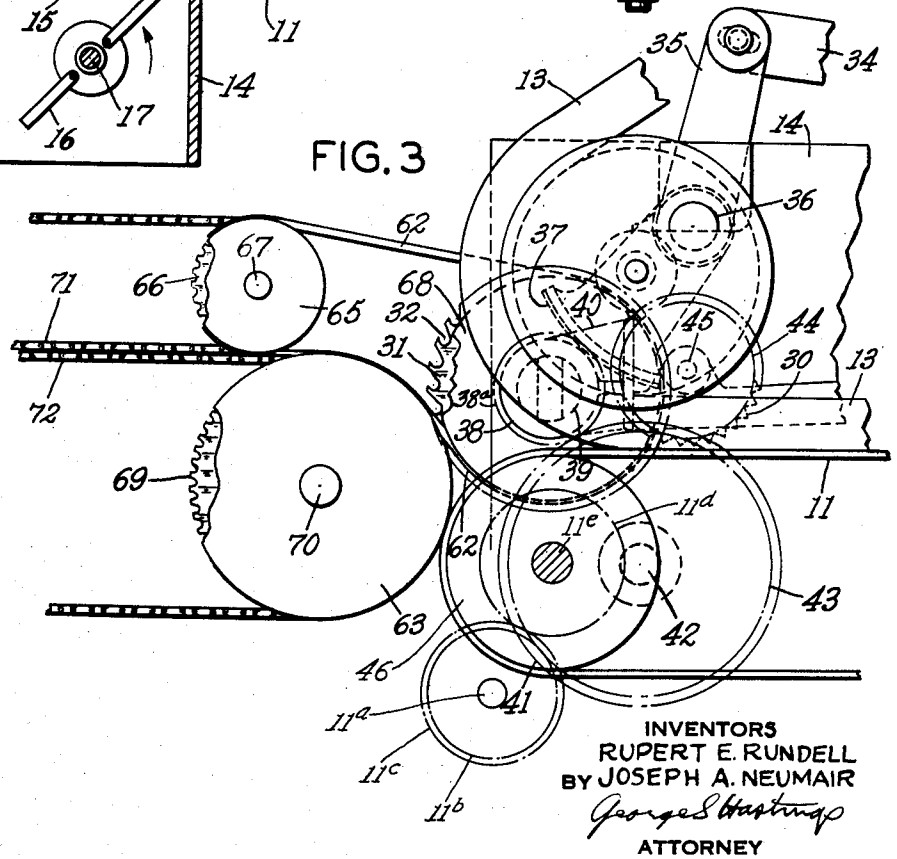

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FIG. 5

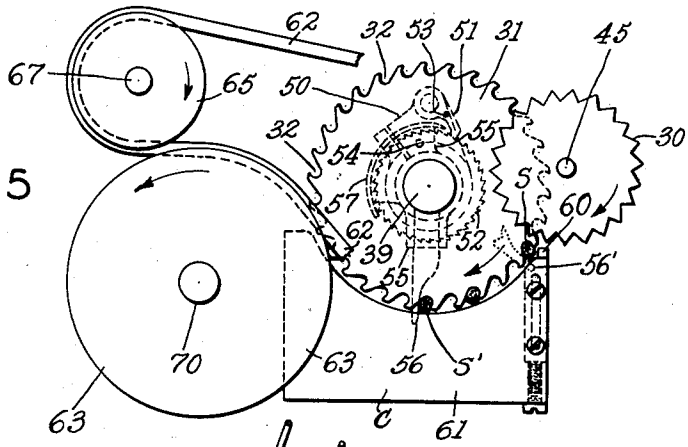
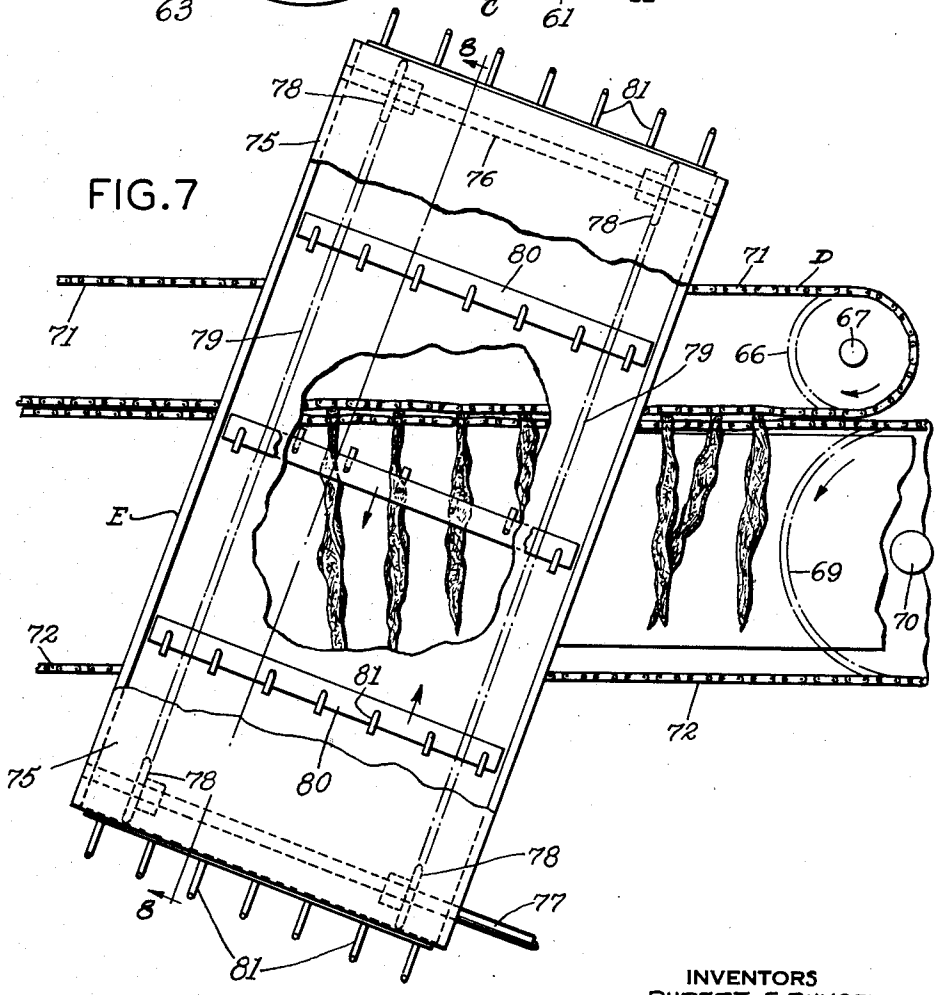


FIG. 7



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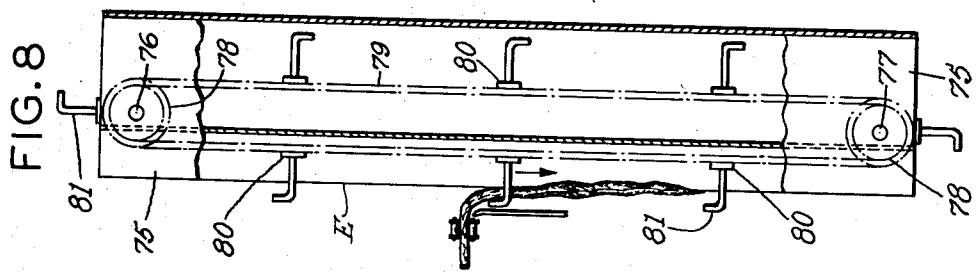

FIG. 8

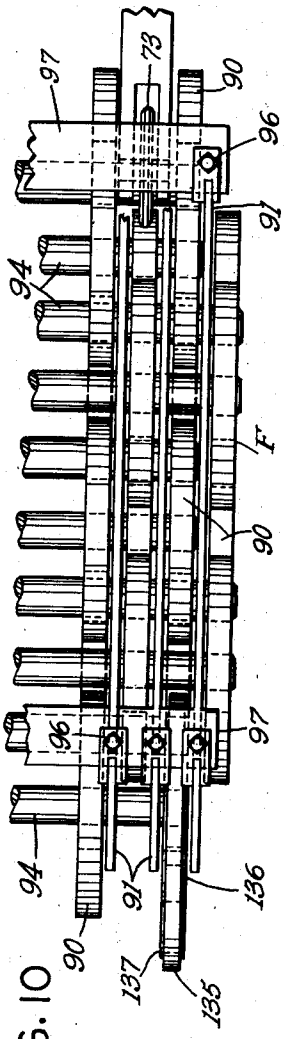

FIG. 10

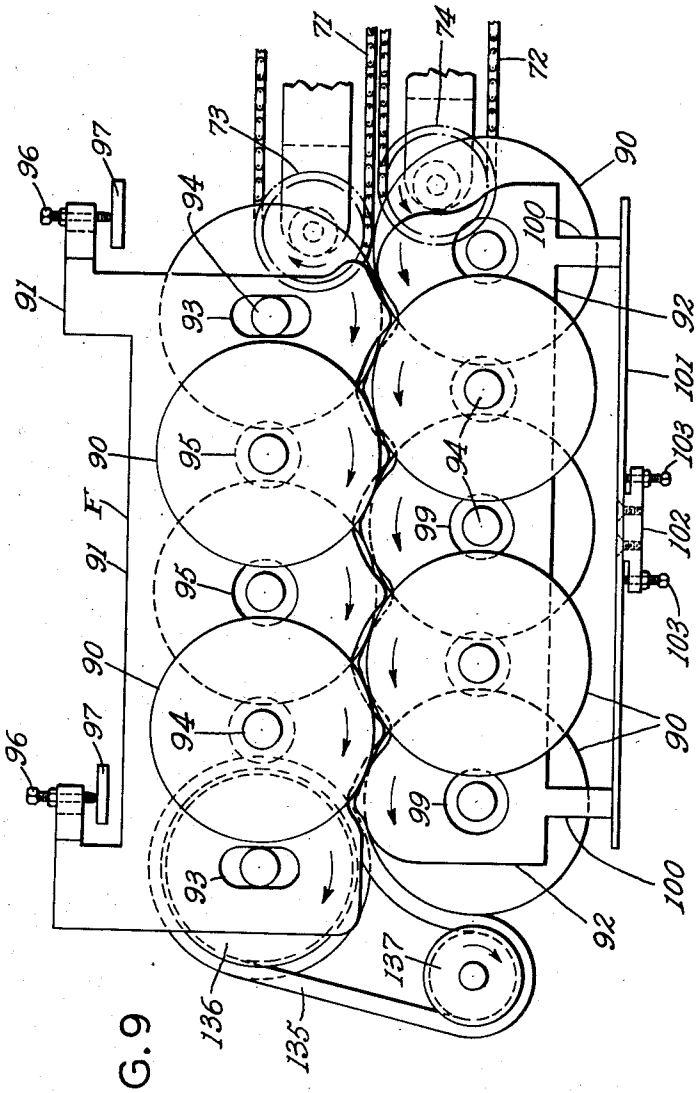

FIG. 9

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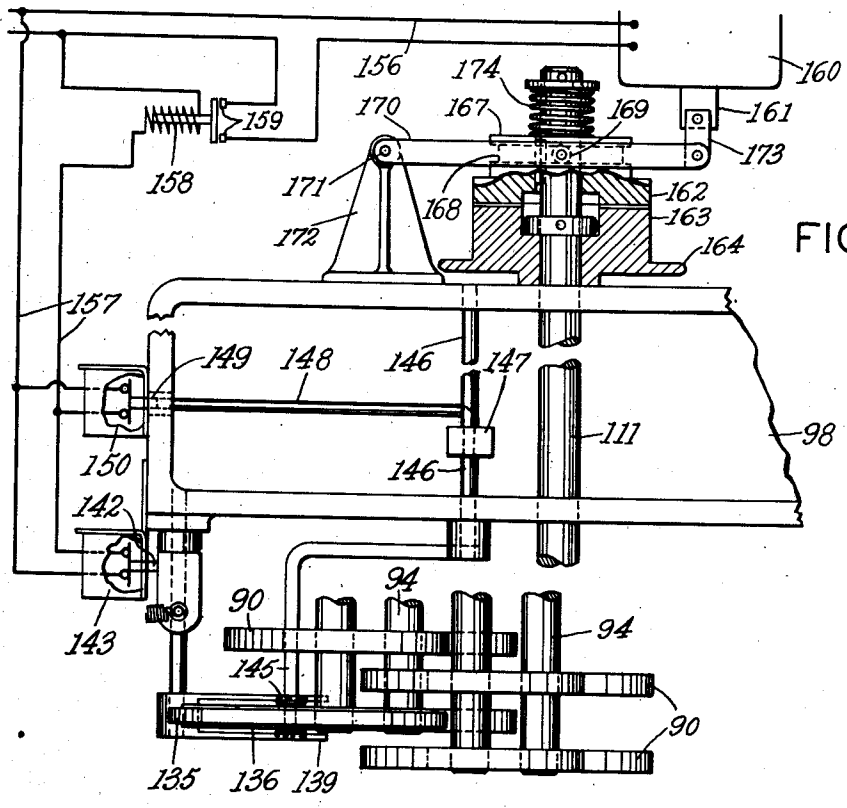

FIG. 13

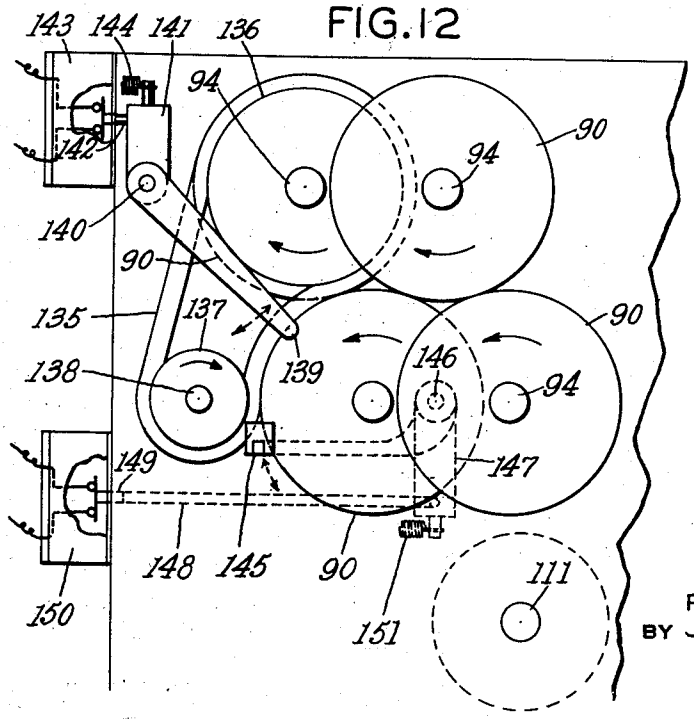

FIG. 12

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FIG. 14

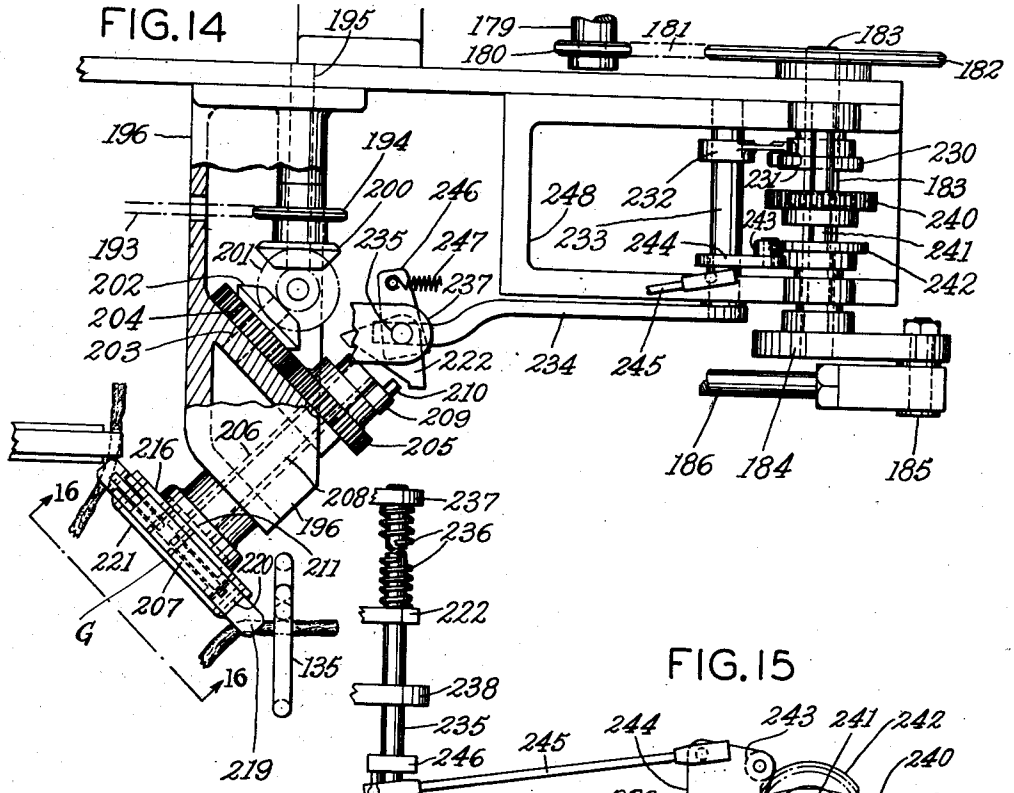

FIG. 15

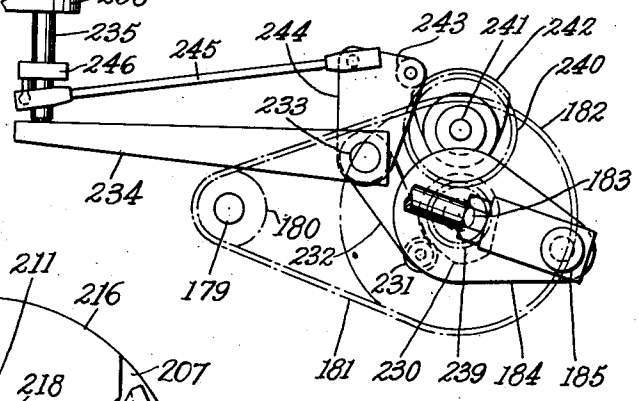

FIG. 16

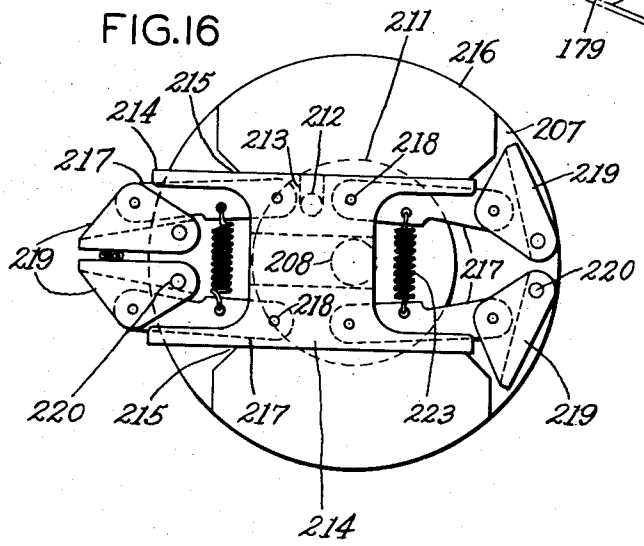

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FIG.17

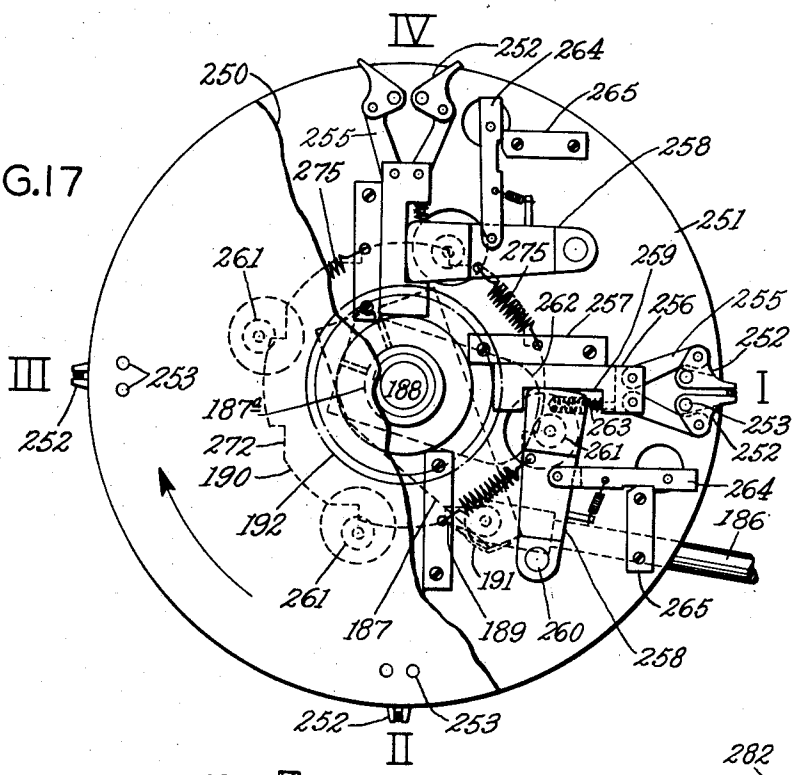


FIG. 18

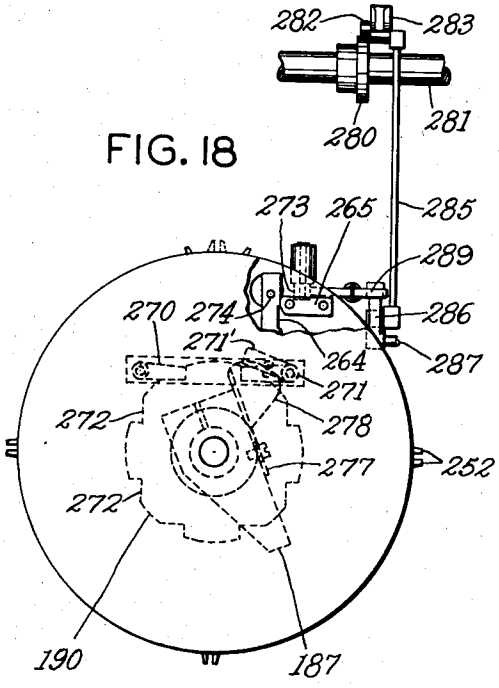
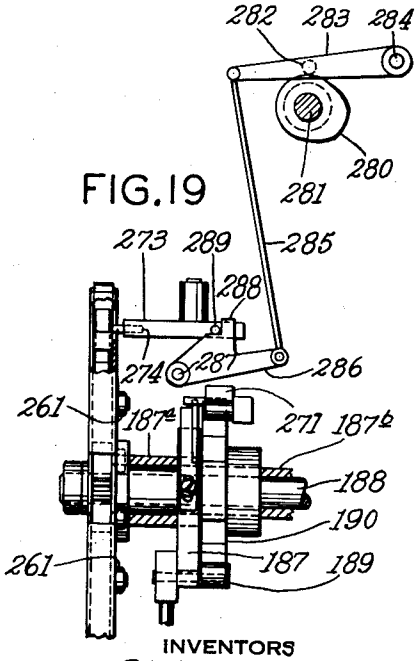


FIG.19



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Patented May 23, 1939 2,159,404

UNITED STATES PATENT OFFICE

2,159,404

TOBACCO LEAF FEED

Rupert E. Rundell, Rockville Centre, and Joseph A. Neumair, Hollis, N. Y., assignors to International Cigar Machinery Company, a corporation of New Jersey

Application December 23, 1936, Serial No. 117,322

27 Claims. (Cl. 131—60)

This invention relates to stemming machines, more particularly to tobacco leaf feeds for machines of this type.

The main object of the invention is to separate the tobacco leaves from a bunch or "hand" and transfer them singly to a stemming machine. The prior leaf feeds were subject to the disadvantage that occasionally a plurality of leaves would be transferred to the machine whereby the same was clogged or its operation impaired. With this in mind the present leaf feed has been provided with a system of control fingers arranged to engage the stem butts of successive leaves in transit to the machine, after they have been initially separated by slowly revolving flails and transferred to continuously rotating accelerator rolls which increase the spacing of the stem butts, and stop the rotation of said rolls whenever there is a succession of stem butts therein with the spacing requisite for delivery to the stemming machine in successive cycles thereof.

In the operation of the leaf feed whenever the foremost stem butt is presented within the range of action of the grippers of an intermittently revolving wheel it displaces the respective control finger and will be seized and transferred to the stemming machine; but unless each of the control fingers are displaced simultaneously by a stem butt the rotation of the accelerator rolls will continue. Thus, if the gripper wheel fails to remove the leaf presented within its range of action and there is a stem butt ready for delivery from behind the next control finger, the further feeding of the stem butts behind the control fingers will be stopped until the foremost stem butt is removed. Therefore, in normal operation the stem butts cannot be fed faster than the rate at which the gripper wheel removes them and piling up of stem butts and the removal of more than one leaf at a time is prevented. By virtue of this arrangement when the foremost stem butt is removed after the feeding of stem butts has been interrupted there will always be a second available, properly spaced from the foremost stem. If desired the gripper wheel will transfer the stem butt to a gripper turret which seizes it, makes nearly a full turn before reaching the station where the stem butt is delivered to the machine, wherefore it will tend to pull its leaf portion away from the following leaf if entangled therewith. It may be desirable where floor space need not be conserved to omit the gripper wheel and arrange the turret in its place at an acute angle to the presented stem butts, to directly remove and transfer the leaves to the stemming machine.

A further object of the invention is to separate entangled leaves prior to the delivery of their stem butts to the accelerator rolls. To this end there is provided a traveling rake having a component of movement in the direction of movement of the forwarded leaves.

Still another object of the invention is to improve the operation of the accelerator rolls, making an actual success of what was formerly a failure. To this end a series of opposed yielding members have been provided at the accelerator rolls to press the stem butts into the apices between adjacent rolls so that the stem butts will not tend to remain lodged therein, as heretofore but will be advanced out of the respective apex by the coaction of said members with the rolls. The adjacent faces of these members, it may be noted have a configuration corresponding to the desired path of the stem butts through the accelerator rolls.

With these and other objects not specifically mentioned in view the invention consists in certain constructions and combinations hereinafter fully described and then specifically set forth in the claims hereunto appended.

In the accompanying drawings, which form a part of this specification and in which like characters of reference indicate the same or like parts:

Fig. 1 is a schematic plan view of a tobacco-leaf feed embodying the invention;

Fig. 2 is a schematic side elevation of one form of stemming machine with which the improved leaf feed may be used;

Fig. 3 is a side elevation of the leaf-feed separator and feed control;

Fig. 4 is a plan view of the same;

Fig. 5 is a detailed side elevation of a portion of Fig. 3;

Fig. 6 is a cross-section of the beater box taken on line 6—6 of Fig. 4 showing the beaters which separate the butt ends of the stems;

Fig. 7 is a front view of the leaf conveyor and rake unit which tends to separate any leaves if they become entangled;

Fig. 8 is a sectional view of said unit taken on line 8—8 of Fig. 8;

Fig. 9 is a side view of the accelerating rolls each traveling faster than the preceding roll which separates the stems;

Fig. 10 is a plan view of the same;

Fig. 11 is a side elevation of the drive for the accelerating rolls;

Fig. 12 is a side elevation of a portion of the accelerating rolls showing the control fingers of the feed unit;

Fig. 13 is a plan view of the same;

Fig. 14 is a plan view of the transfer turret which delivers the leaves from the accelerating rolls to the turret delivering to the stemming machine;

Fig. 15 is a partial end elevation of the same;

Fig. 16 is an enlarged view of the transfer turret taken from line 16—16 of Fig. 14;

Fig. 17 is an end view of the turret which delivers the leaves to the stemming machine;

Fig. 18 is a view of Fig. 17, on a smaller scale, showing the mechanism for opening the jaws of the turret at the discharge station; and

Fig. 19 is a side elevation of the same.

In the general view, Fig. 1, the reference character A designates generally the feed-in mechanism, B the stem butt separator, C the stem butt separator star wheel unit, which delivers, so far as is practicable at this point, one stem at a time to the leaf conveyor D, carrying the leaves through a rake mechanism E which acts to straighten any entangled leaves before entering the speed-up separating rolls F from which the separated leaves are delivered one at a time to the turret G which transfers them to a turret H delivering to grippers J of the stemming machine shown in Fig. 2.

When a bundle of leaves is received by the operator of the machine, he removes the tie leaf from the bundle and strikes the butt ends of the leaves upon the plate 10 (Fig. 1) which action serves to loosen them. He then disposes them upon suitable forward means which may be of well known construction comprising the wide belt 11 and auxiliary belts 12, with their butt ends overhanging the belt 11 and aligned by the plate 10 in which position they are advanced in a direction at right angles to their stems. While the leaves may be otherwise held against displacement on the feed belt 11 during the butt-separating operation, as shown herein, there is provided means cooperating with the forwarding means for holding the leaves against displacement while their butts are being separated. This holding means includes a pressure belt 13 overrunning and frictionally driven from the belt 11 and arranged to press the stem butts against the belt 11 to prevent the beating means from displacing or dragging the leaves off the belt. Since this pressure belt, as well as the belts 11 and 12, are of the same construction disclosed in Patent No. 1,301,193, granted to C. V. Strickland, a more detailed description of the same is deemed unnecessary. However, it may be noted that the belt 12*a* (Fig. 1) may be driven from the shaft of the idle pulleys of the belts 12 to advance the stem butts of tobacco leaves along the plate 10.

The butt-separating mechanism (see Figs. 4 and 6) includes a casing 14 open at its top and bottom and suitably supported from the main frame of the machine. The side walls of the casing are cut away to provide a stem-way 15, as is clearly shown in Fig. 6; and through this stem-way the stem butts S, which overhang the adjacent edge of the feed belt 11, enter and leave the casing while the leaves are held between the belt 11 and the cooperating pressure belt 13. The butt-separating mechanism includes two series of flails 16 movable in an orbital path between and along the stem butts. The flails of each series are pivoted to rotary members 17 journaled in suitable bearings formed in the casing 14. Each of the rotary members 17 is driven at a speed great enough to cause the flails 16 to be projected substantially radially by the centrifugal force developed during rotation. By referring to Fig. 6 it will be readily seen that the two series of flails are superposed, one being mounted above the stem way 15 through the casing and one below it. The flails act upon the stem butts S as the feed belt 11 advances the leaves and operate to straighten and also to separate said stem butts if they should be gummed together or entangled. Although the construction of the present butt-separating mechanism is in some respects similar to that of the butt-thresher shown in the Strickland patent referred to above, in the present invention the number of flails employed and the speed of rotation have been reduced. Therefore the present slower moving flails act to separate the stem butts without threshing the laminae from the butts, as is the case with the butt-thresher as disclosed in the above mentioned patent. The members 17 are driven from the main drive shaft 18 (Fig. 1) said shaft being provided with a sprocket 19 driving a sprocket 20 on a shaft 21 by means of a chain 22. The shaft 21 is also provided with a bevel gear 23 meshing with a bevel gear 24 mounted on shaft 25, this latter shaft carrying spiral gears (not shown) which drive spiral gears (not shown) on the members 17.

After the butt ends of the leaves have been separated, the feed mechanism advances the leaves into the range of action of a star wheel 30, Figs. 3, 4 and 5. The initially separated stems are then picked off one by one so far as is practical at this point by the above mentioned star wheel 30 which has notches in its periphery designed to receive one stem at a time. The wheel 30 delivers the butt end of each leaf to a saw-toothed wheel 31 provided with pockets 32 wherein successive stem butts are received.

The wheels 30 and 31 are intermittently driven from an eccentric (Fig. 1) carried by shaft 18 on which is loosely mounted a strap connected by an eccentric rod 34 (Figs. 1, 3 and 4) to an arm 35 fastened to a shaft 36 journaled in bearings of the casing 14. An oscillatory motion is thereby imparted to shaft 36. A gear segment 37 attached to shaft 36 (Fig. 3) meshes with a pinion 38 loosely mounted on shaft 39 and operating a pawl and ratchet mechanism hereinafter described, which imparts intermittent motion to shaft 39 carrying the saw-toothed wheel 31. Shaft 39 is journaled at one end in a bearing in a flange formed on the casing 14 and, at its other end, in a bracket 40 attached to said casing. Pinion 38*a* fastened on the protruding end of shaft 39 drives a gear 41 mounted on shaft 42 supported in the casing 14, and a gear 43 also carried by said shaft drives a gear 44 attached to a shaft 45 thereby intermittently imparting motion to the star wheel 30 fastened thereon. A shaft 11*a* mounted below shaft 42 (Fig. 3) is provided with gears 11*b* and 11*c* meshing respectively with the gear 43 and the gear 11*d* on the shaft 11*e* which carries the drive pulleys of the belts 11 and 12 (Fig. 1) whereby the latter are intermittently driven in synchronism with the wheels 30 and 31.

On an arm 50 clamped to the hub of gear 38 (Figs 4 and 5) is pivotally mounted a pawl 51 engaging with a ratchet wheel 52 fastened on shaft 39. The pawl is tensioned by a spring (not shown) spanning the posts 53 and 54 (Fig. 5) carried by the pawl 51 and arm 50, respectively. An arm 55 loosely mounted on shaft 39 (Fig. 5) carries a feeler 56 disposed in the path of the butt ends of the leaves advanced by the wheel 31 and a shroud 57 which partly surrounds the ratchet wheel 52.

The star wheel 30 revolves intermittently with a linear speed equal to that of the belts 11 and 12 and picks a stem butt at a time from the mass of separated stem butts on the feed belt 11 and

delivers it to pockets 32 of wheel 31. If a stem butt should not be fully lodged in any one of the pockets, a spring tensioned plunger 60 (Fig. 5) tends to push and seat it therein after being depressed by the stem butt during its advancing movement into the pocket 32 and also to prevent the passage of more than one stem butt at a time. This plunger is supported in a block 61 having a concave top wherein the stem butts are guided while being advanced by the wheel 31 into position to be gripped between a conveyor belt 62 and the sheave 63. When the pockets of wheel 31 are empty the stem butt initially engages the feeler while it is in its normal position 56', as indicated by fragmentary dotted lines (Fig. 5); and the stem butt S then pushes against the feeler and swings the same about its pivot until the stem is gripped between the belt 62 and sheave 63 and thereby carried away from under the feeler, whereupon a coil spring 64 (Fig 4) attached to the arm 55 and anchored to a post in the casing 14 returns the feeler towards its initial position. However if any stems should be lodged in the pockets of the wheel 31, as shown in Fig. 5, the finger will stop against the foremost stem S', and in so doing bring the shroud 57 to rest in a position wherein it will encounter and lift the pawl 51 during the ineffective or counter-clockwise movement thereof from the ratchet wheel 52. Therefore while the arm is being vibrated in the opposite or clockwise direction the shroud will hold the pawl disengaged for a position of its stroke, until the pawl slips off the end of said shroud and re-engages and drives the ratchet wheel 31.

It will readily be seen that if any pockets of wheel 31 are filled it will be turned only a fraction of the extent it would otherwise be displaced during the feeding stroke of the pawl. When each of the pockets 32 of wheel 31 is supplied with a stem, it will be understood that the shroud will hold the pawl disengaged a maximum duration of each feeding stroke and the wheel 31 will be displaced only one pocket at a time. In this manner the feeler 56 governs the drive of the star wheel 30 and feed-in belts 11 and 12, so that a stem butt will be transferred to one of the pockets of the wheel 31 in each cycle of the device as long as stem butts are fed to the wheel 30 by the belts 11 and 12. Moreover, jamming of the stems cannot occur between the feed wheels 30 and 31, because the wheel 31 will be turned sufficiently in each cycle of the device to present a vacant tooth space to the wheel 30.

The belt 62 is driven by a pulley 65 (Fig. 3) integral with an idler sprocket 66 mounted on a stud 67 and runs over an idler pulley 68 on shaft 39 and is held taut by a sheave 63 integral with a sprocket 69 on shaft 70. The stems gripped between the belt 62 and sheave 63 are led between the opposed runs of the conveyor chains 71 and 72 and thereby gripped and advanced by the same. The chains 71 and 72 run over the sprockets 66 and 69 and idler sprockets 73 and 74 respectively (Fig. 9) and coact to carry the stem butts to a series of accelerator rolls, hereinafter described, each traveling faster than the preceding roll, which further separate the stems.

The leaves whose stem butts are gripped between the chains 71 and 72 are often criss-crossed, because the leaves in the "hand" whence they were separated are not brought into parallel relation by the butt separating operation since they are gripped between the belts 11 and 13. Accordingly, downwardly traveling rakes are provided as shown in Figs. 7 and 8, to separate any leaves if they should be entangled due to such criss-crossing or other causes. The motion of the rakes has a component in the direction of movement of the leaves forwarded by the conveyor in order that this operation may be carried out efficiently while the chains 71 and 72 are traveling. Suitable mechanism for actuating the rakes is provided comprising a casing 75 supporting an upper shaft 76 and a lower shaft 77, said shafts being suitably inclined and equipped near their ends with sprockets 78 driving a pair of chains 79 which are connected by spaced bars 80 carrying rakes 81 adapted to engage and comb the leaves. The main shaft 18 (Fig. 1) carries a sprocket 82 driving a chain 83 running over a sprocket 84 mounted on a shaft protruding from a gear box 85, the interior of the gear box being provided with suitable gearing driving the shaft 77 of the rake mechanism.

The conveyors 71 and 72 advance the stem butts of the leaves into the range of action of a device which operates to accelerate and further separate the stem butts so that they may be removed by suitable mechanism hereinafter described and advanced singly through the stemming machine. The separating or spacing device includes series of opposed rollers, the upper rollers being offset relative to the lower rollers thereof to form a stem way receiving stem butts advanced by the conveyor chains. The rollers of each series are driven at progressively increasing speeds, and the rollers of alternate series are staggered relative to the series flanking them. By virtue of this staggered relation of the rolls there is provided a tortuous stem way wherein the stem butts are spaced as disclosed in the Strickland patent referred to above. This formation of the stem way in the past has defeated the object of speed up and separating the stems, as often a stem will stop in the apex between opposed rollers and remain there until a succeeding stem advances it sufficiently to be nipped. In the present device the stem way has the same formation, and there are also provided three sets of opposed members 91 and 92 having interfitting configurations on their inner faces and disposed between each adjacent series of rollers but the rolls 90 are made several times larger in diameter to permit lobes of the members 91 and 92 to guide the stems into the apices between opposed rolls 90 in the manner shown in Fig. 9. In practice the Strickland rolls had a diameter of ¾'' whereas we tried rolls of 3½'' diameter with favorable results, and rolls 4 to 5'' diameter would probably give superior results. The members 91 and 92 thereby guide the stems when they enter the spaces between opposed rolls and force the stem against the rolls opposite their lobes, which thereupon impart a twirling motion to and thus advance them between the same and their opposite rolls. A similar twirling motion is imparted to the stem butts alternately in opposite directions due to the coaction of a roll with its opposed roll revolving at a lesser speed and the next roll revolving at a greater speed, and the same greatly facilitates the separation of adhering stem butts. The upper plates 91 are provided with slots 93 admitting the journals 94 of the outermost rolls 90 which limit their movement to a vertical direction and are also provided with apertures 95 large enough to pass over the journals of the intermediate rolls 94 and allow up and down movement thereof. In inwardly projecting lugs of the plates 91 are threaded adjusting screws 96 resting against

cross strips 97 supported by the casing 98 (Fig. 13) carrying the shafts 94. The screws 96 provide for the proper setting of the lowermost position of plates 91 for the particular thickness of stem butt being operated on. The lower members 92 are provided with apertures 99 large enough to pass over shafts 94 and allow up and down movement thereof. The plates 92 are provided with legs 100 resting on flat springs 101 attached to a bar 102 extending from the bottom of casing 98, bar 102 being equipped with adjusting screws 103 permitting the ends of the spring plates to be deflected to maintain them yieldingly in the uppermost position wherein it will coact most efficiently to guide the particular size of stem butts.

The rolls, as previously mentioned, are driven at progressively increasing speeds so that the stem butts are successively accelerated and thus separated as they pass through the stem way. Although other means may be employed for driving the rolls, in the particular construction selected for exemplification of the same they derive their motion from a gear 110 mounted on a jack shaft 111 (Figs. 1, 11, 12 and 13) suitably mounted in the casing 98. The gear 110 is in mesh with a gear 112 mounted on a shaft 113 also carrying a sprocket 114 over which a chain 115 runs. The endless chain 115 is led around sprockets carried by each of the shafts 94, the sprockets successively decreasing in diameter whereby the speeds of the shafts 94 are progressively increased from right to left. In this manner the rolls 90 carried by said shafts separate the stem butts as they pass through the stem way. The chain 115 is also led around an idler sprocket mounted on shaft 116. The jack shaft 111 is also provided with a sprocket 117 (Figs. 1 and 11) which drives a chain 118 running over a sprocket 119 attached to a shaft 120. Shaft 120 is also provided with a pinion 121 in mesh with a gear 122 mounted on shaft 123 supported in the casing 98. The shafts 120 and 123 (Fig. 1) carry a sprocket 124 and 125, respectively, which drive chains 126 and 127 running over sprockets 128 and 129 which are mounted on shafts 130 and 131 carried by a bracket 132 fastened to the frame of the machine. The inner ends of shafts 130 and 131 are equipped with sprockets 133 adn 134, respectively, (Fig. 1) which drive the upper and lower chains 71 and 72 (Fig. 9).

Referring now to Figs. 12 and 13, the stem butts on leaving the last set of rolls 90 are guided and carried downward by a belt 135. Belt 135 is driven by a pulley 136 fixed on the upper shaft 94, of the last set of rolls 90 and runs over an idler pulley 137 attached to a shaft 138, and around a portion of the lower roll 94 of this set. Each stem butt is thereby carried downwardly by the belt 135 against a control finger 139 carried by a pivot shaft 140 which also carries a contact maker 141 normally held by springs 144 in position to depress a contact 142 of a switch 143 and close the circuit through the same until tripped by the engagement of a stem butt with the arm 139 to break said circuit. The arm is returned to its original position by the spring 144 after the stem butt has passed beyond it, the continued descent of the stem butt finally causing it to trip a second control finger 145 dipsosed between the sheave 137 and the lower roll 90. This latter finger is carried on the free end of a pivoted arm 146 which also carries a block 147 provided with a rod 148 pivoted thereon and projecting through an aperture of the casing 98 to engage a contact 149 of a switch 150. A spring 151 tends to normally hold the rod 148 in engagement with the contact 149 and thereby close the circuit through the switch 150. When a butt stem engages the lower arm 145 the rod 148 is retracted and the circuit through the switch 150 is broken. Thereupon grippers, hereinafter described, on wheel G (Fig. 1) engage said stem and remove it, and if for some reason the gripper wheel should fail to remove the stem the following stem coming through the series of rolls 90 will trip the arm 139 and break the circuit through switch 143. If the other contact 149 is already open, an electromagnetic clutch, to be hereinafter described, becomes energized and automatically disengaged, thus stopping the feeding of the leaves by the rolls 90 and the conveyor 71—72. The switches 143 and 150 are connected in parallel by the branch lines 157 to the supply mains 156, wherefore as long as either of the switches remains closed the flow of current from the branch lines 157 energizes a relay 158 and thereby breaks the circuit through the contacts 159 of main line 156. When both switches 143 and 150 are open there is no flow of current to the relay, and thus the relay will close and make contact with the contacts 159 of the main line 156 and send a current to a solenoid 160, thereby energizing the same and retracting its core 161 so that the male clutch member 162 will be disengaged from the female clutch member 163 whereby the rolls 90 and conveyor 71—72 are stopped. Member 163, which is loosely mounted on shaft 111, is integral with a sprocket 164 driven by a chain 165 running over a sprocket 166 fastened to the main shaft 18 (Fig. 1). Member 162 is splined on the end of shaft 111, and its hub 167 is provided with an annular cam track 168 engaging a roller 169 carried by the clutch throw-out lever 170 which is fulcrumed on a stud 171 carried by a bracket 172. The other end of lever 170 is connected by a link 173 to the solenoid core 161. It is readily seen that whenever the core is pulled inwardly the lever 170 swings about its fulcrum 171 and thereby disengages the clutch members 162—163. A compression spring 174 seated against a collar on the end of shaft 111 tends to normally hold the member 162 in engagement with member 163.

When the conveyor chains 71 and 72 are stopped the belt 62 also stops, but the wheel 31 keeps on turning until it advances a stem butt into the bight of the belt 62 and sheave 63, thereby pushing back the feeler 56 to that point and turning the shield sufficiently so that the pawl 51 can no longer engage the ratchet during its to and fro movement. The movement of the wheel 31 and the star wheel 30 and the feed belts 11 and 12 is thus halted until the chains 71 and 72 and the belt 62 resume their travel and take away the stem butt lodged between the belt 62 and sheave 63.

Referring now to Fig. 2 wherein the gripper wheel is shown to be driven from the stemming machine if desired, a bevel gear 175 fixed on a shaft 176 is driven from the motor 177 and meshes with a bevel gear 178 fastened on one end of a shaft 179. At its other end the shaft 179 carries a sprocket 180 (Figs. 1 and 14) driving a chain 181 running over a sprocket 182 fixed on shaft 183. A crank disk 184 fastened to the opposite end of shaft 183 is provided with a crank-pin 185 supporting a rod 186 connected to a rocker-arm 187 which is clamped to a bushing 187a (Fig. 19) loosely mounted on a sleeve 187b which in turn is loosely mounted on a stationary shaft 188.

Arm 187 is equipped with a pawl 189 arranged to engage a ratchet wheel 190 fastened on sleeve 187b and in this manner impart intermittent motion to the sleeve 187b. A leaf spring 191 (Fig. 17) fastened to arm 187 maintains the pawl 189 in engagement with the ratchet wheel 190. A sprocket 192 carried by sleeve 187b drives a chain 193 running over a sprocket 194 (Figs. 1 and 14) mounted on a shaft 195 which is supported in a bearing of a bracket 196 (Fig. 14). Shaft 195 is provided with a bevel gear 200 in mesh with a bevel gear 201 which in turn drives a bevel gear 202 on a stub shaft 203. A spur gear 204 also carried by shaft 203 drives a spur gear 205 fast on one end of a sleeve 206 revolubly mounted in the bracket 196, and on the other end of the sleeve is fastened the gripper wheel 207. A stud 208 fitting loosely within the sleeve 206 is equipped with an arm 209 provided with a pin 210 which is periodically engaged by mechanism hereinafter described, to open and close the jaws of the gripper wheel 207. The head 211 of stud 208 (Fig. 16) has a pin 212 engaging in a vertical groove 213 in the inner face of a member 214 slidably mounted in a slot 215 of the flange 216 of the gripper wheel 207. The member 214 is milled out or relieved at its ends to accommodate the links 217 which are pivotally mounted therein on studs 218. The other ends of the links are connected to gripper jaws 219 pivoted on studs 220 passing through the flange 216 and a face plate 221, Fig. 14.

The pin 210, which controls the opening and closing of jaws 219, is operated by a kicker arm 222 which is actuated by two cams as will be presently described. One cam raises the arm 222 to a level where it will encounter and obstruct the movement of the pin 210 and stud 208, wherefore the pin 212 will displace the member 214 to the right. In moving to the right the links 217 force the open jaws 219 past their dead center position and allow the springs 223 connecting one set of links 217 to close the corresponding pair of jaws. The displacement of member 214 also causes the other set of links 217 to open the other pair of jaws which were formerly closed. The second cam is provided to oscillate the kicker arm 222 in and out of the path of travel of pin 210. The gripper wheel 207 is driven intermittently and completes one-half revolution in each cycle and in so turning the gripped stem butt is carried from the belt 135 and its opposed roll 90 to the turret H (Fig. 1). The rotation of the gripper turret also carries the pin 210 one hundred and eighty degrees to a position wherein the arm 222 will be in position to engage the pin 210 and open the jaws 219 delivering a stem butt to the turret H and also close the jaws 219 receiving the next stem butt from between the belt 135 and its opposed roll 90.

The oscillating motion of arm 222 is derived from a cam 230 on shaft 183 engaging a cam roller 231 carried by a cam lever 232 fulcrumed on a shaft 222 (Fig. 15) which also carries an arm 234 adapted to engage the lower end of a vertical rod 235 on which is fastened the kicker arm 222. A compression spring 236 on the upper end of rod 235 bears against the arm 222 and thereby holds the cam roller 231 in contact with cam 230. The rod 235 is slidably mounted in lugs 237 and 238 of the bracket 196 and the spring 236 is seated against the lug 237. Shaft 183 carries a pinion 239 meshing with and driving a gear 240 mounted on shaft 241. This shaft also carries a cam 242 engaging a cam roller 243 which is carried by a bell-crank 244 pivoted on shaft 233. A rod 245 equipped at each end with ball-and-socket joints connects bell-crank 244 to an arm 246 fastened on rod 235a. In this manner cam 242 imparts oscillating motion to the kicker arm 222 whereby the latter is swung in or out of the path of pin 210. A spring 247 attached to arm 246 has its other end anchored to a post (not shown) on the casing 248, said spring holding the cam roller 243 in contact with cam 242.

The large turret H, Fig. 1, is provided with circular face plates 250 and 251 (Fig. 17) which are fastened to sleeve 187b, and in the space between them are supported the jaws and their operating members. The set of grippers 252 then at station I picks up the stem butt delivered by the gripper wheel 207, jaws 252 closing on the stem butt shortly before the gripper jaws 219 of wheel 207 are opened, thereby preventing the leaves from dropping. The jaws 252 are pivoted on pins 253 passing through plates 250 and 251, and are connected by links 255 to slidably mounted actuator blocks 256. Blocks 256 slide against the faces of guides 257 attached to plate 251, and their movement is derived from cam-actuated arms 258 which are adapted to engage in a recess 259 of their respective blocks 256. Arms 258 are pivoted on studs 260 of plate 251 and provided with cam rollers 261 engaging a cam piece 262 clamped on bushing 187a (Figs. 17 and 19) which, as mentioned above, is loosely mounted on the sleeve 187b. Arm 258 at its upper end, is provided with a recess wherein is seated a spring 263 which bears against the member 256 and tends to push the same outward and thereby close the gripper jaws 252. On each arm 258 is also pivotally mounted a latch 264 engaging a bar 265 fastened to face plate 251, as shown, to hold the jaws at station I in their closed or gripping position. The jaws 252 travel clockwise and retain their hold on the stem butts until staiton IV is reached where the jaws are opened and the stem butts are seized by the grippers J (Fig. 2) which carry the leaves through the stemming machine.

As mentioned above, the rod 186 (Fig. 17), which is actuated by crank 184, imparts motion to the arm 187 and the pawl mounted thereon advances the ratchet wheel and turret one-quarter revolution at a time. The cam piece 262 also travels along with arm 187, and on the return motion of the arm and cam the latter engages the cam roller 261 and closes the gripper jaws 252 which have just moved from station IV to station I. Thereupon the turret is locked in position by two spring pawls 270 and 271 which drop into engagement with adjacent teeth 272 of the ratchet wheel 190 (Fig. 18). In this locked position the jaws 252 at station IV are opened by means of a cam actuated arm 273 which engages a knock-out pin 274 carried by latch 264 and releases the latch from member 265, permitting a spring 275 to pull arm 258 and thereby move member 256 inwardly to open the jaws 252. The separation of jaws 252 is timed to coincide with the closing of jaws J of the continuously running conveyor chain 276 (Fig. 2) of the stemming machine. When arm 187 is moved in a counter-clockwise direction a trip piece 277 (Fig. 18) attached to said arm having a rounded portion 278 contacts a pin carried by pawl 271 and lifts the pawl to position 271', free from the ratchet surface 272 permitting the turret to be again turned in a clockwise direction by the pawl 270. Arm 273 derives its motion from a cam 280 fast on a shaft 281 (Fig. 2) of the stemming machine

bearing against a cam roller 282 on the cam lever 283 which is fulcrumed on a shaft 284. A rod 285 connects the lever 283 to an arm 286 pivotally mounted on a shaft 287 which is suitably supported by the frame of the stemming machine. A lug 288 of arm 286 engages and actuates a rod 289 carried by the pivotally mounted arm 273, whereby the arm 273 is swung into the path of the pin 274 to cause the opening of the jaws 252.

Referring to Fig. 2, the gripper jaws J of the conveyor chains 276 seize and remove the stems from the turret H, and carry them through suction chambers 290 wherein they are straightened out and cleaned. The straightened leaves are forwarded on the bottom loops of suction belts 291 and are then dropped upon belts 292 running in the opposite direction, a valve, not shown, in suction pipe 293 periodically shutting off the suction in chambers 294 at the proper moment. The belts 292 together with companion belts 295 guide the leaves into the stemming mechanism 296 which removes the stems and permits the stemmed leaves to be carried away, tip first, by an endless delivery belt 297 running in the forward direction. The chain 276 and belts 291, 292, 295 and 297 are synchronously driven by the motor 177, as disclosed in the United States Patent No. 1,916,018 of R. E. Rundell.

In practice it has been found that the provision of the gripper wheel G intermediate the accelerator rolls F and the gripper turret H tends to prevent the transfer of leaves devoid of stem butts. Such leaves sometimes become entangled with a leaf whose stem butt is gripped and are thereby carried on through the accelerator rolls. When the stem butt of the whole leaf with which the broken leaf is entangled is seized by the grippers of the gripper wheel, it has been found that the broken leaf is whirled or flung off the seized leaf. This may be explained as due to the greater angular velocity of the wheel G to maintain it at the same peripheral speed as the turret H. Therefore a greater centrifugal force is imparted to the broken leaf entangled with the leaf seized in the grippers of the wheel G than in the case of the turret H. Accordingly, the entangled leaf will be whirled off the seized leaf on the wheel G at the speeds required for delivery to the stemming machine, although the same result would not be obtained if the wheel were omitted and the stem butts were delivered directly to the grippers of the turret H.

What is claimed is:

1. The combination with a stemming machine periodically operating to seize a stem butt presented within its range of action and thereupon advance and stem the seized tobacco leaf, of mechanism for continuously separating tobacco leaves from a bunch and advancing them toward said machine, means operating in synchronism with said machine for transferring a leaf at regular intervals from said mechanism into the range of action of said machine, and a device for stopping said mechanism only whenever there is a succession of leaves at the delivery end of the same with the spacing requisite for delivery during successive cycles into the range of action of said means and until the foremost leaf is removed thereby.

2. The combination with mechanism for separating tobacco leaves from a bunch, of members for continuously advancing the separated leaves toward a stemming machine, means for transferring individual leaves at regular intervals from said members to said machine, and a device for temporarily stopping said members only whenever there is a succession of leaves disposed therein with the spacing requisite for delivery to said means in successive cycles thereof.

3. The combination with a stemming machine periodically operating to seize a stem butt presented within its range of action and thereupon advance and stem the seized tobacco leaf, of mechanism for continuously separating tobacco leaves from a bunch and advancing them toward said machine, means operating in synchronism with said machine for transferring a leaf at regular intervals from said mechanism into the range of action of said machine, and a device for stopping said mechanism only whenever there is a succession of leaves at the delivery end of the same with the spacing requisite for delivery during successive cycles into the range of action of said means and until the foremost leaf is removed thereby, said members including a train of opposed sets of rollers coacting to nip the stem butts of the tobacco leaves and accelerate and thereby further separate the same, and an endless traveling belt coacting with the last roller of said train to deliver a succession of leaves into the range of action of said means, and said device including spaced feelers arranged to simultaneously engage stem butts between said last roller and belt which have the requisite spacing for delivery to said means in successive cycles thereof.

4. The combination with mechanism for separating tobacco leaves and continuously advancing the same toward a stemming machine, means for transferring individual leaves at regular intervals from said mechanism to said machine, members for continuously advancing leaves into said mechanism, and a device for temporarily incapacitating said mechanism and members whenever there is a succession of leaves at the delivery end of said mechanism with the spacing requisite for delivery into the range of action of said means during successive cycles of the same.

5. The combination with means for separating the stem butts of a layer of tobacco leaves, mechanism for gripping the separated stem butts and transporting the tobacco leaves, and a device for combing the leaves being so transported to separate any entangled leaves, said device including a member adapted to disentangle leaves gripped by said mechanism and having a component of motion in the direction of movement of the leaves.

6. The combination with means for separating the stem butts of a hand of tobacco leaves, mechanism for gripping the separated stem butts and transporting the tobacco leaves, and a device for combing the leaves being so transported to separate any entangled leaves, said mechanism including traveling members coacting to grip the stem butts therebetween, and said device including rakes having a movement greater than and along the length of the leaves advanced by said members and means for moving said rakes in a rectilinear path along the length of the leaves.

7. The combination with means for separating individual leaves from a mass, of mechanism for gripping the stem butts of the separated leaves and continuously advancing the same, a turret disposed in a plane extending obliquely to the portion of the stem butts between said mechanism and their leaf portions, sets of coacting grippers on said turret arranged to grip the portions of the stem butts between said

mechanism and their leaf portions and withdraw the same from said mechanism, and means for actuating said sets of grippers successively.

8. The combination with means for intermittently advancing a mass of tobacco leaves sidewise, of instrumentalities adapted to separate the stem butts of the advancing leaves, a wheel provided with pockets each adapted to receive a stem butt, a device for transferring the separated stem butts from said means to the pockets of said wheel, mechanism for intermittently driving said wheel and means, a member disposed in the path of and actuated by stem butts advanced in said pockets for governing the amplitude of the intermittent motion of said wheel and means, and endless traveling surfaces coacting to remove stem butts from said pockets.

9. The combination with means for intermittently advancing a mass of tobacco leaves sidewise, of a series of revolving flails adapted to separate the stem butts of the advancing leaves, a wheel provided with pockets each adapted to receive a stem butt, a device for transferring the separated stem butts from said means to the pockets of said wheel, mechanism for intermittently driving said wheel and means, a member disposed in the path of and controlled by stem butts advanced in said pockets for governing the amplitude of the intermittent motion of said wheel and means, continuously traveling mechanism arranged to grip stem butts in said pockets and withdraw and continuously advance the same, a stemming machine, a device for gripping and transferring the stem butts from said continuously traveling mechanism to said machine, and members disposed in the path of the stem butts in said continuously traveling mechanism and connected thereto for temporarily stopping it when there is a succession of stem butts therein with the spacing requisite for delivery to said device in successive cycles of said machine.

10. The combination with a set of intermittently driven belts adapted to advance a bunch of leaves sidewise, of revolving members arranged to separate the stem butts of leaves advanced by said belts, a pocketed transfer member revolving in synchronism with said belts, a star wheel revolving in synchronism with said belts and arranged to transfer individual separated stem butts to the pockets of said transfer member, a yielding member underlying said star wheel and disposed to prevent the delivery of more than one stem butt to a single pocket of said transfer member, and continuously traveling members for removing the stem butts from the pockets of said transfer member.

11. The combination with a set of intermittently driven belts adapted to forward a mass of tobacco leaves sidewise, of revolving members arranged to separate the stem butts of leaves advanced by said belts, a pocketed wheel revolving in synchronism with said belts, a member revolving in synchronism with said belts and arranged to transfer individual stem butts to the pockets of said wheel, a pawl-and-ratchet mechanism driving said wheel, said transfer member and belts being driven from said wheel, a device controlled by the position of the foremost stem butt in the pockets of said wheel for regulating the amplitude of the movement imparted to the wheel by said pawl-and-ratchet mechanism, and continuously traveling members acting to remove stem butts from the pockets of said wheel.

12. The combination with a set af intermittently driven belts adapted to forward a mass of tobacco leaves sidewise, of revolving members arranged to separate the stem butts of leaves advanced by said belts, a saw tooth wheel revolving in synchronism with said belts, a star wheel revolving in synchronism with said belts and arranged to receive individual stem butts in its pockets and transfer the same to the pockets of said saw tooth wheel, a pawl-and-ratchet mechanism driving said saw tooth wheel, said star wheel and belts being driven from said saw tooth wheel, a device controlled by the position of the foremost stem butt in the pockets of said saw tooth wheel for regulating the amplitude of the movement imparted to the saw tooth wheel by said pawl-and-rachet mechanism, a concave underlying said saw tooth wheel and over which the stem butts are advanced by the saw tooth wheel, a continuously traveling belt, and an idler sheave coacting with said continuously traveling belt to receive the stem butts from said concave and carry them away.

13. The combination with a set of intermittently driven belts adapted to forward a mass of tobacco leaves sidewise, of revolving members arranged to separate the stem butts of leaves advanced by said belts, a saw tooth wheel revolving in synchronism with said belts, a star wheel revolving in synchronism with said belts and arranged to receive individual stem butts in its pockets and transfer the same to the pockets of said saw tooth wheel, a pawl-and-ratchet mechanism driving said saw tooth wheel, said star wheel and belts being driven from said saw tooth wheel, a device controlled by the position of the foremost stem butt in the pockets of said saw tooth wheel for regulating the amplitude of the movement imparted to the saw tooth wheel by said pawl-and-ratchet mechanism, continuously traveling members arranged to admit therebetween stem butts from said saw tooth wheel and grip and transport the same, mechanism for continuously driving said continuously traveling members, and control fingers arranged to engage successive stem butts advanced by said continuously traveling members and connected to said driving mechanism to temporarily stop the same upon simultaneous displacement of each of said fingers by stem butts.

14. The combination with a set of intermittently driven belts adapted to forward a mass of tobacco leaves sidewise, of revolving members arranged to separate the stem butts of leaves advanced by said belts, a saw tooth wheel revolving in synchronism with said belts, a star wheel revolving in synchronism with said belts and arranged to receive individual stem butts in its pockets and transfer the same to the pockets of said saw tooth wheel, a pawl-and-ratchet mechanism driving said saw tooth wheel, said star wheel and belts being driven from said saw tooth wheel, a device controlled by the position of the foremost stem butt in the pockets of said saw tooth wheel for regulating the amplitude of the movement imparted to the saw tooth wheel by said pawl-and-ratchet mechanism, a stemming machine, and mechanism for gripping stem butts advanced by said saw tooth wheel and transferring them to said stemming machine.

15. The combination with a set of traveling belts adapted to advance a mass of tobacco leaves sidewise, of continuously traveling members arranged to receive the stem butts of tobacco leaves delivered from said belts, mechanism for advancing to said continuously traveling members the stem butts of tobacco leaves carried by said belts,

pairs of top and bottom continuously revolving rolls arranged to admit therebetween stem butts from said members and coacting to progressively accelerate the stem butts to increase the intervals between the same, said top rolls being sufficiently offset relative to their respective bottom rolls to coact with the bottom roll of the next pair, and yielding members having protuberances fitting into the apices between adjacent top rolls and adjacent bottom rolls to press the stem butts thereagainst.

16. The combination with pairs of top and bottom continuously revolving rolls positively and directly coacting to advance the stem butts of tobacco leaves at progressively increasing speed, said top rolls being sufficiently offset relative to their respective bottom rolls to coact with the bottom roll of the next pair in further advancing the stem butts, and yielding members having opposed faces defining the desired path of the stem butts through said rolls.

17. The combination with pairs of top and bottom continuously revolving rolls coacting to advance the stem butts of tobacco leaves at progressively increasing speed, said top rolls being sufficiently offset relative to their respective bottom rolls to coact with the bottom roll of the next pair in further advancing the stem butts, and yielding members having opposed faces defining the desired path of the stem butts through said rolls, said members having protuberances entering the apices between adjacent top and bottom rolls to press the stem butts thereagainst.

18. The combination with opposed pairs of rolls coacting to grip the stem butts of tobacco leaves and advance the same, of a stemming machine, mechanism for driving said rolls, a device for gripping the stem butts of tobacco leaves delivered by said rolls and transferring the same to said machine, and control fingers arranged to engage successive stem butts advanced by said rolls and connected to said driving mechanism to stop the same when each of said control fingers are displaced simultaneously by the stem butts.

19. The combination with means for gripping leaves of tobacco by their stem butts and advancing the same, of a device for seizing the portion of the stem butts between said means and the leaf portion and withdrawing the leaf from said means, said device including a turret provided with sets of grippers successively to seize and remove stem butts from said means, and means for actuating said grippers to seize and then release the stem butt after the turret has completed nearly a half turn.

20. The combination with sets of opposed members successively coacting to grip the stem butts of tobacco leaves and advance the same, mechanism for driving said members, means for gripping stem butts advanced by said members and withdrawing them from the members, and control fingers arranged to engage successive stem butts advanced by said rolls and connected to said driving mechanism to stop the same when all of said control fingers are displaced simultaneously by the stem butts.

21. In a tobacco leaf feed, the combination with a series of opposed pairs of rotating rolls coacting to successively nip the stem butts of tobacco leaves and advance the same, of opposed members arranged adjacent said rolls and provided with raised portions opposite a roll of each pair adapted to guide the stem butts into apices between opposed rolls and force the stem butts against the rolls opposite thereto whereby a twirling motion is imparted to the stem butts.

22. The combination with pairs of opposed rolls revolving at progressively increasing speeds and coacting to advance the stem butts of tobacco leaves at progressively increasing speed, one roll of each pair revolving at a greater peripheral speed than the other roll and being sufficiently offset to coact with a roll of the next pair and revolving at a slower peripheral speed than the latter, whereby a twirling motion is imparted to the stem butts in opposite directions alternately, of means for driving said rolls.

23. The combination with means for gripping stem butts of tobacco leaves and thereby advancing the same, of a series of spring-actuated grippers coacting to seize the stem butts of the tobacco leaves and withdraw the same from said means and transfer them to a stemming machine and a cam-actuated device normally separating said grippers and intermittently releasing the grippers to seize a stem butt and thereafter separating said grippers to release the stem butt, said device including toggles of which said grippers form one link and a sliding member for actuating said toggles to cause the grippers to grip and release the stem butts.

24. The combination with means for gripping stem butts of tobacco leaves and thereby advancing the same, of a series of grippers coacting to seize the stem butts of the tobacco leaves and withdraw the same from said means, movable actuators for said grippers, and yielding connections between said actuators and grippers compensating for varying thicknesses of stem butts.

25. The combination with means for gripping the stem butts of tobacco leaves and thereby advancing the same, of a revolving wheel provided with sets of grippers coacting to seize and remove the stem butts from said means, and a turret having a much greater diameter than said wheel but revolving at the same peripheral speed and provided with sets of jaws coacting to seize and remove the stem butts from said wheel and transfer the same to a stemming machine, the speed of said wheel being sufficient to cause any leaf devoid of a stem butt and entangled with the seized leaf to be whirled off the latter.

26. The combination with mechanism for separating tobacco leaves from a layer, of an intermittently moving member for seizing the stem butts of and thereby transferring leaves at regular intervals to a stemming machine, means for continuously advancing the leaves from said mechanism into the range of action of said member at one station thereof, and a device for stopping said means with the stem butt of the foremost leaf in the range of action of said means and immediately restarting said means when the foremost leaf is removed.

27. The combination with means for transferring tobacco leaves to a stemming machine, of mechanism for advancing leaves into said means, a device for separating leaves from a layer and advancing them into said mechanism, and feelers arranged to be engaged and displaced by the stem butts of leaves advanced by said mechanism and device and controlling the same to stop the feeding of the leaves from said device and mechanism whenever the respective feelers are sufficiently displaced from initial position by advancing stem butts.

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