July 1, 1941. R. E. RUNDELL 2,247,413

CIGARETTE MACHINE

Filed July 2, 1937 2 Sheets-Sheet 1

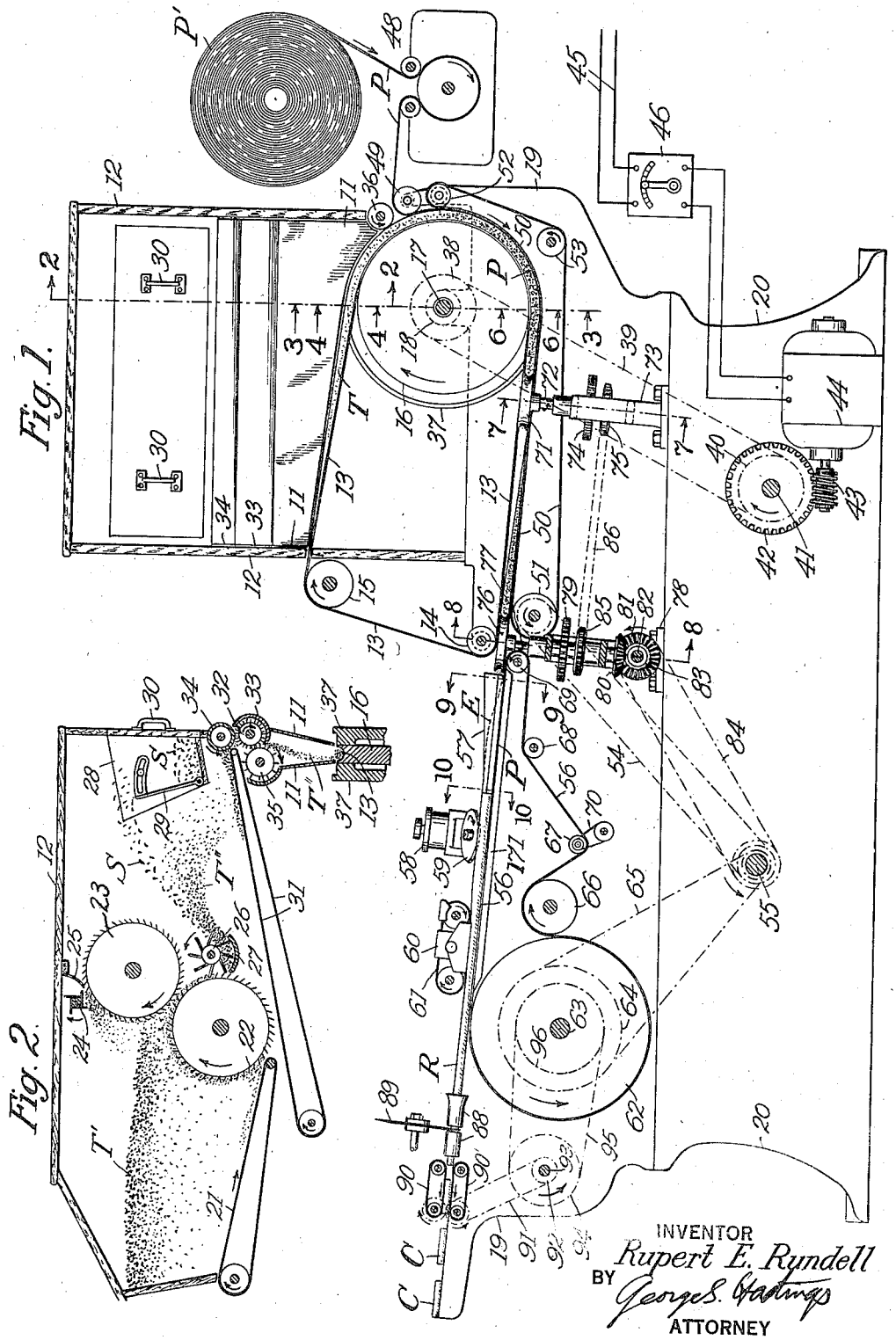


Fig. 1.

Fig. 2.

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Fig. 3.

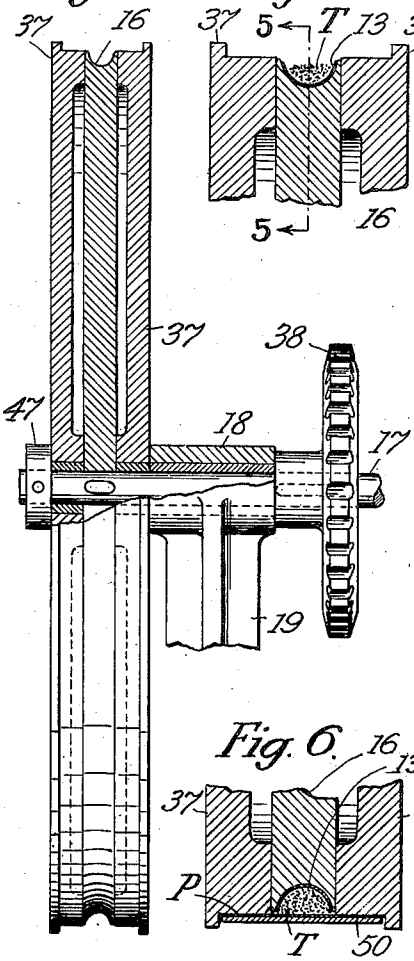


Fig. 4.

Fig. 7.

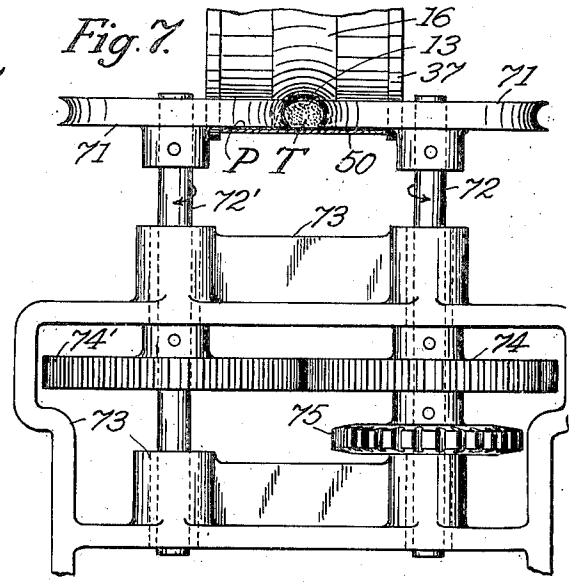


Fig. 8.

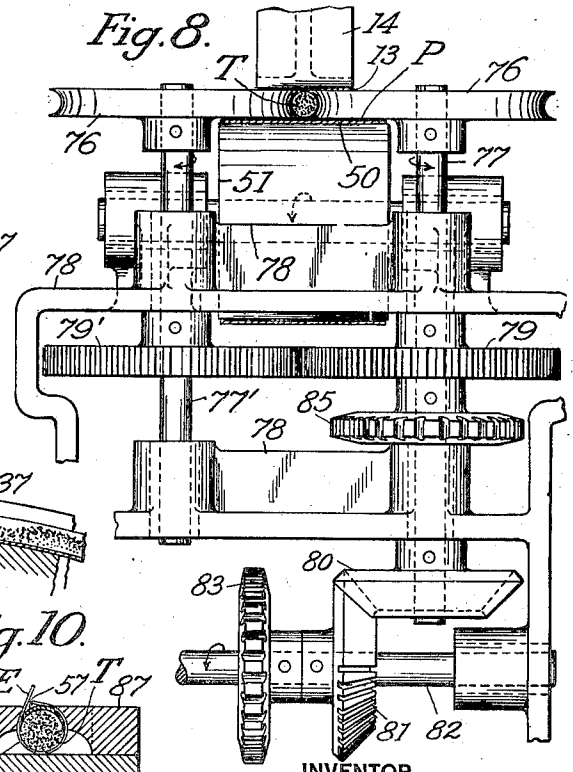


Fig. 6.

Fig. 5.

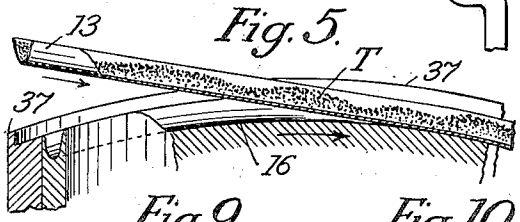


Fig. 9.

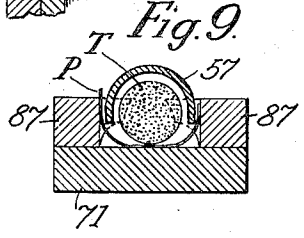
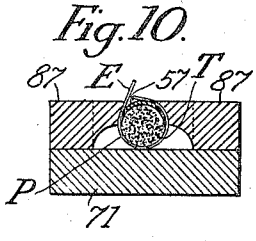


Fig. 10.



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2,247,413

CIGARETTE MACHINE

Rupert E. Rundell, Rockville Centre, N. Y., assignor to American Machine & Foundry Company, a corporation of New Jersey

Application July 2, 1937, Serial No. 151,683

10 Claims. (Cl. 131—66)

This invention relates to improvements in continuous rod machines, its main object being to pre-form and densify axially the tobacco filler before it enters the rod-forming tongue, thereby to attain optimum conditions for producing a uniform cigarette rod.

Heretofore it has been the usual practice to deposit the tobacco shower from the cigarette machine feed directly on to the paper web, or on to a separate conveyor belt which discharges the same on to the paper web, before the latter enters the rod former wherein the paper is folded around the tobacco filler and compressed to cigarette size. The tobacco shower, which even in the best constructed tobacco feeds is far from uniform, is showered and settles on the moving paper web or on the intermediate conveyor belt in the form of a more or less irregular mat having hills and dales, and the rod former tongue therefore has to do all the work of shaping this uneven mat into a cylindrical rod in a comparatively short space. This, especially in the case of a high speed machine, will cause occasional choking of the tobacco in the rod former tongue with consequent hard and soft spots in the rod, if the choking is not severe enough to cause breakage of the paper.

With this in mind, in the embodiment of the invention selected for illustration herein, the tobacco is showered on to a conveyor belt running over a large wheel having a semicircular peripheral groove, the paper web being fed adjacent said wheel and guided around a portion of the same so that it reaches the rod former with the tobacco charge partly formed into rod shape, the rounded groove of the wheel preforming the top of the charge which enters at the roof of the rod-former tongue where most of the shaping work is performed. The conveyor belt portion which enters the circumferential groove at the top of the grooved wheel conforms to the contour of the groove, embracing the stream of tobacco on three sides, exerting an axially tractive effect thereon, and the grooved wheel is preferably run at a substantially higher speed than that of the paper web, which closes the open side of the belt-lined groove, confining the tobacco therein, so that the tobacco charge, thus confined in the groove-curved conveyor belt, is advanced into the channel formed between the belt and paper web, and slips upon the relatively smooth surface of the paper. It is thus compacted to uniformity, and is preformed by means of compressor rolls between which it eventually passes to the rod former.

Any hills and dales are smoothed out before the paper web reaches the rod former, and moreover, the comparatively long interval between the take-off point on the forming wheel and the entrance of the rod former permits preforming the sides and bottom of the filler rod by suitable means such as suitably grooved compressor wheels, so that the rod former is relieved of most of its forming work and now serves mainly to fold the paper web around the already formed tobacco charge and to compact the same to cigarette size. The tobacco attains the desired density while passing through these wheels.

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 the characters of reference indicate the same or like parts:

Fig. 1 is a diagrammatic side elevation of a cigarette machine embodying the present invention;

Fig. 2 is a cross-section on line 2—2 of Fig. 1, showing the tobacco feed and its delivery to the feed conveyor belt in the groove of the forming wheel;

Fig. 3 is a cross-section in part on an enlarged scale taken on line 3—3 of Fig. 1, showing the construction of the grooved forming wheel;

Fig. 4 is an enlarged cross-section on line 4—4 of Fig. 1, showing the stream of filler tobacco on entering the forming wheel;

Fig. 5 is a fragmentary perspective view shown partly in section along the line 5—5 of Fig. 4, showing the tobacco mat on the filler tobacco conveyor;

Fig. 6 is an enlarged cross-section on line 6—6 of Fig. 1, showing the relative position of the tobacco conveyor belt and of the paper web on leaving the forming wheel;

Figs. 7 and 8 are enlarged cross-sections on lines 7—7 and 8—8 of Fig. 1, showing the compressor wheels for pre-forming the sides of the stream of filler tobacco;

Fig. 9 is an enlarged cross-section on line 9—9 of Fig. 1, showing the pre-formed filler rod at the entrance of the rod-former tongue; and

Fig. 10 is an enlarged cross-section on line 10—10 of Fig. 1, showing the formed cigarette rod on emerging from the rod-former tongue.

Referring to Figs. 1 and 2, the tobacco stream T delivered by the chute 11 of the tobacco feed 12 is showered upon an endless belt or strip member 13 which is guided over rollers 14 and 15 and around a large grooved wheel 16 fastened on a horizontal shaft 17 supported in a bearing 18 of the cigarette machine frame 19 which rests on a bed 20. In the tobacco feed 12, which is of conventional construction, a supply of shredded tobacco T' rests on an endless belt 21 which moves the tobacco mass towards the pins of a carded drum 22 which rotates upwards. The pins of a carded refuser drum 23 placed above drum 22 and rotating in the same direction comb the surplus tobacco from the pins of drum 22. Any tobacco picked up by drum 23 is blown back to the mass of tobacco T' by a fan 24 rotating in the direction of the arrow. To prevent air disturbances by this fan on the delivery side of the tobacco feed there is provided a guard 25 extending across drum 23. The tobacco layer on drum 22 is removed by a picker roller 26 running in a concave 27, this picker roller also acting as a winnower and throwing the heavier stem particles S into a box 28 having an angularly adjustable wall 29. The box 28 is provided with handles 30 whereby it may be removed for disposal of the stems S. The lighter tobacco particles T'' fall on an endless belt 31 which carries them to a carded drum 32 running in a concave 33, the tobacco layer being guided into the pin spaces of the drum 32 by a compressor wheel 34 running in the direction of the arrow shown. From the drum 32 the filler tobacco is finally showered by a picker roller 35 into the chute 11 which deposits the tobacco stream T on the conveyor belt 13. A roll 36 at one end of chute 11 prevents spilling of tobacco as the belt 13 emerges from the chute.

The grooved wheel 16 is mounted between two flanged wheels 37 (Fig. 3) loose on shaft 17 which has a sprocket 38 driven by a chain 39 from a sprocket 40 on a shaft 41, the latter having a worm wheel 42 driven by a worm 43 on the shaft of a motor 44. The motor 44 is energized from supply lines 45 through a controller 46 of well known construction, so that the wheel 16 can be independently run at any desired speed greater than the velocity of the paper web P. The wheels 37 are held in rubbing contact with wheel 16 by a collar 47 on shaft 17.

The paper web P is drawn from a reel P' and after passing through a printer 48 of conventional construction, is guided by a roller 49 on to the periphery of the flanged wheels 37, the paper web fitting between the flanges of the wheels 37 and extending across the groove of wheel 16. The web P is guided around a sector of wheels 16 and 37 by an endless belt or strip member 50 running over rollers 51, 52 and 53, the roller 51 being driven by a chain 54 from the drive shaft 55 of the cigarette machine and the motion of belt 50 causing the wheels 37 to rotate on shaft 17.

The tobacco layer T on belt 13, due to the winnowing action of picker roller 26, is more or less uneven as it enters the groove of wheel 16 (Figs. 4 and 5), but owing to the greater peripheral speed of wheel 16 as compared with that of the wheels 37, the tobacco travels faster than the paper web, thus gradually compacting uniformly and filling up any hollows so that on emerging from wheel 16 (Fig. 6) the belt has deposited a homogeneous charge T of semi-circular cross-section on the paper web P. The pre-formed stream of tobacco so obtained is carried on the paper web which after leaving the belt 50 is supported and propelled by the rod-forming tape 56, carrying the stream first through additional shaping devices 76 to be hereinafter described, then passing onto the tape 56, and advancing the stream to the rod former tongue 57 in which it is compacted to cigarette size, and is wrapped in the paper and the rod is forwarded then to the paster 58, the wheel 59 of which applies paste to the upright edge E of the web as it passes through the lap former 171 wherein the paper is lapped about the filler rod, and finally to the sealer 60 of well known type wherein a heated moving endless band 61 engages the seam and dries the paste, thus completing the cigarette rod R.

The tape 56 is driven at the same linear speed as the belt 50 by a tape wheel 62 on a shaft 63 having a sprocket 64 driven by a chain 65 from the main shaft 55, and runs over rollers 66, 67, 68 and 69, the roller 67 being mounted on an adjustable arm 70 to regulate the tension of the tape which runs through the lap former 171 which supports the cigarette rod while it is being formed and sealed.

In the space between the take-off point of wheel 16 and the entrance of the rod-former, which is provided to permit the conveyor belt 13 to gradually resume its flat position on guide roller 14, the stream of filler tobacco may be shaped into rod form. For this purpose a number of pairs of coacting compressor wheels are provided which successively compact the filler tobacco into cylindrical shape approaching the actual cigarette size. Near the delivery point of wheel 16 the first set of compressor wheels 71 (Fig. 7) is placed above the paper web P with their centers at such a distance that their grooved rims enclose an oval space somewhat narrower than the groove in wheel 16. Into this oval space the downwardly bent edges of belt 13 enter as they leave wheel 16 and thus round off the bottom of the stream of tobacco T. The wheels 71 are mounted on vertical shafts 72 and 72' supported in a pedestal 73 attached to bed 20 and having gears 74 and 74' in mesh with one another, the shaft 72 being provided with a sprocket 75 driven in the direction of the arrow as shown. Near the rod former 57, the final pre-forming wheels 76 (Fig. 8) are located, and their grooved rims at their points of tangency form a circle, resting on the paper web P at the lower point of tangency and touching the conveyor belt 13 as it runs on to the roller 14, thus compacting the filler tobacco T into true cylindrical shape. The wheels 76 are mounted on vertical shafts 77 and 77' which are supported in a frame 78 and carry gears 79 and 79'. The shaft 77 has a bevel gear 80 driven by a bevel gear 81 on a shaft 82 supported in frame 78, the shaft 82 having a sprocket 83 driven by a chain 84 from the main shaft 55 of the cigarette machine. Over a sprocket 85 on shaft 77 runs a chain 86 driving the sprocket 75 on shaft 72 of compressor wheel 71, the transmission being so arranged that the peripheral speed of the compressor wheels 71 and 76 is the same as the linear speed of the belt 50.

The cylindrical filler rod T issuing from the compressor wheels 76 enters the rod former tongue 57 (Fig. 9), the edges of the paper web P being turned upwards by the side guides 87 which gradually fold the web around the tongue 57 so that on emerging from the rod former

tongue (Fig. 10) the paper P is folded completely around the compacted charge T with one edge E overlapping and extending upwards.

After this overlapping edge has been pasted and sealed, the completed cigarette rod R enters the ledger tube 88 of the cut-off 89 of well known construction, which cuts the same into individual cigarettes C. On leaving the tube 88, the finished cigarettes enter between two parallel endless belts 90, 90' driven at a somewhat higher speed than the rod belt 56 by a chain 91 from a sprocket 92 on a shaft 93 which has a sprocket 94 connected by a chain 95 with a sprocket 96 on shaft 63 of tape wheel 62. The belts 90, 90' coact to accelerate and thereby separate the severed cigarettes C so that they may be properly collected and stacked in the usual manner.

It will be understood that in passing through the compressor wheels 71, the filler tobacco is further densified, due to their constriction of the margins of the belt 13 as shown in Fig. 7. It will be noted that in Fig. 1, for the sake of clearness in illustrating the densification of the filler as it approaches the wheel 71, the nearer margin of the belt has been omitted. It is shown however, to the left of wheel 71, at the region where it gradually flattens out upward to the line of tangency with roller 14.

What is claimed is:

1. The combination with a rod former acting to draw a cigarette paper web from a roll and fold it about filler tobacco, of a set of traveling members coacting to form a traveling channel receiving the stream of filler tobacco and preforming and delivering it to said rod former, and means for feeding a stream of filler tobacco into said channel at a linear speed greater than that of said members, said means including a circumferentially grooved wheel traveling at a peripheral speed greater than that of the paper web and a conveyor belt driven by said wheel and arranged to receive a shower of filler tobacco and convey it through said groove to partially pre-form the same, and mechanism for guiding the cigarette paper over and in contact with the tobacco in said groove to confine the same therein whereby it will be compacted to uniformity and pre-formed.

2. The combination with means for advancing a web of cigarette paper, of means for depositing a continuous stream of tobacco upon said cigarette paper web and thereafter compacting the same axially, said means including a traveling compactor engaging the sides of the tobacco stream and traveling at a speed greater than the speed of the cigarette paper, said compactor having a smooth surface engaging said stream of tobacco and gripping the sides thereof along said paper web and traveling at a constant speed such that it will impart to the particles of tobacco a greater speed than the speed of the slower moving tobacco particles on the cigarette paper web to cause the same to compact on the slower moving tobacco particles advanced by the cigarette paper web.

3. The combination with means for advancing a web of cigarette paper, of means for depositing a continuous stream of tobacco upon said cigarette paper web and thereafter compacting the same axially, said means including a smooth surface engaging the sides of the stream of tobacco on the cigarette paper and traveling at a constant linear speed greater than that of the paper, said surface traveling at a constant speed such that it will impart to the particles of tobacco a greater speed than the speed of the slower moving tobacco particles on the cigarette paper web to cause the same to compact on the slower moving particles and a variable drive for said surface to permit it to be driven at various constant speeds greater than that of the cigarette paper to obtain various degrees of axial compaction of the tobacco.

4. The combination with a circumferentially grooved disc revolving on a horizontal axis, of a conveyor belt trained over and driven by said disc and having a generally horizontal run adjoining the top of said wheel, a device for showering tobacco on to said run, whereby the same will be conveyed through the groove of the said disc, and an endless belt for confining the tobacco in said groove to cause the same to be partially pre-formed, said conveyor belt being driven at a speed relatively higher than that of the confining belt, and a paper cigarette web driven concurrently between said belts and adapted to receive the tobacco and deliver it eventually in its partially preformed condition from between said belts.

5. The combination with a circumferentially grooved disc revolving on a horizontal axis, of a conveyor belt trained over and driven by said disc and having a generally horizontal run adjoining the top of said wheel, a device for showering tobacco on to said run, whereby the same will be conveyed through the groove of the said disc, an endless belt for confining the tobacco against the conveyor belt in said groove to cause the same to be partially pre-formed, and a set of compressor wheels coacting to press the margins of said conveyor belt, after it leaves said grooved disc, against the filler tobacco to preform the filler tobacco issuing from the groove of said disc.

6. The combination with a rod former acting to fold a cigarette paper web about filler tobacco to form a cigarette rod, of means including an endless supporting tape for advancing into said rod former a cigarette paper web carrying a stream of tobacco, an endless belt opposed to and traveling at a constant linear speed greater than that of the cigarette paper and thereby acting to engage and compact the stream of filler tobacco on the portion of the cigarette paper opposed thereto, axially prior to its delivery to the rod former, and a variable drive for driving said belt at various constant speeds greater than the cigarette paper speed to obtain cigarette rods of varying density.

7. The combination with a rod former acting to draw a cigarette paper web from a roll and fold it about a stream of filler tobacco, of a member for guiding a stream of tobacco into said rod former, an endless belt traveling at a speed greater than said cigarette paper web and having a portion extending in a generally horizontal direction for a substantial extent and disposed to receive a shower of tobacco, whereby a stream of tobacco is formed thereon, and also having a portion opposite said member folded into U cross-section and arranged to grip the sides of a stream of tobacco and advance the same across said member to said rod former and thereby compact the same axially, and members for folding said belt into U cross-section for gripping engagement with the sides of the stream of tobacco, said belt moving relative to said member and having a sufficiently greater speed than the cigarette paper to cause the faster moving particles to compact on the slower moving particles.

8. The combination with a rod former acting to draw a cigarette paper web from a roll and fold it about a stream of filler tobacco, of a set of opposed traveling belts extending into the proximity of said rod former and coacting through a run of substantial extent to form a traveling channel admitting a stream of filler tobacco and axially densifying said stream, and a device for folding one of said belts about said stream for preforming one side of said stream to a rounded cross-section, said belts coacting to deliver the densified and preformed stream of tobacco to said rod former, and at least one of said belts traveling faster than the paper web to produce an axial densification of the stream of filler tobacco between said belts.

9. The combination with a rod former acting to draw a cigarette paper web from a roll and fold it about a stream of filler tobacco, of a set of opposed traveling members moving at different speeds and having opposed vertically extending runs forming a traveling channel admitting a stream of filler tobacco having a transverse cross-section whose area approximates the desired cross-sectional area of the cigarette rod and axially densifying said stream to form a continuous cigarette rod, said members coacting to deliver the continuous tobacco rod axially to said rod former.

10. The combination with a rod former acting to draw a cigarette paper web from a roll and fold it about a stream of tobacco, of a set of opposed traveling belts extending into the proximity of said rod former and coacting through a run of substantial extent to form a traveling channel admitting a stream of filler tobacco and axially densifying said stream, and devices for folding one of said belts about said stream for preforming the same to approximately the desired cross-section of the filler rod in said rod former, said belts coacting to deliver the densified and preformed stream of tobacco to said rod former, and at least one of said belts traveling faster than the paper web to produce an axial densification of the stream of filler tobacco between said belts.

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