May 27, 1941. P. J. HERRMANN 2,243,703

TOBACCO ROD FORMING MACHINE

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Fig. 1

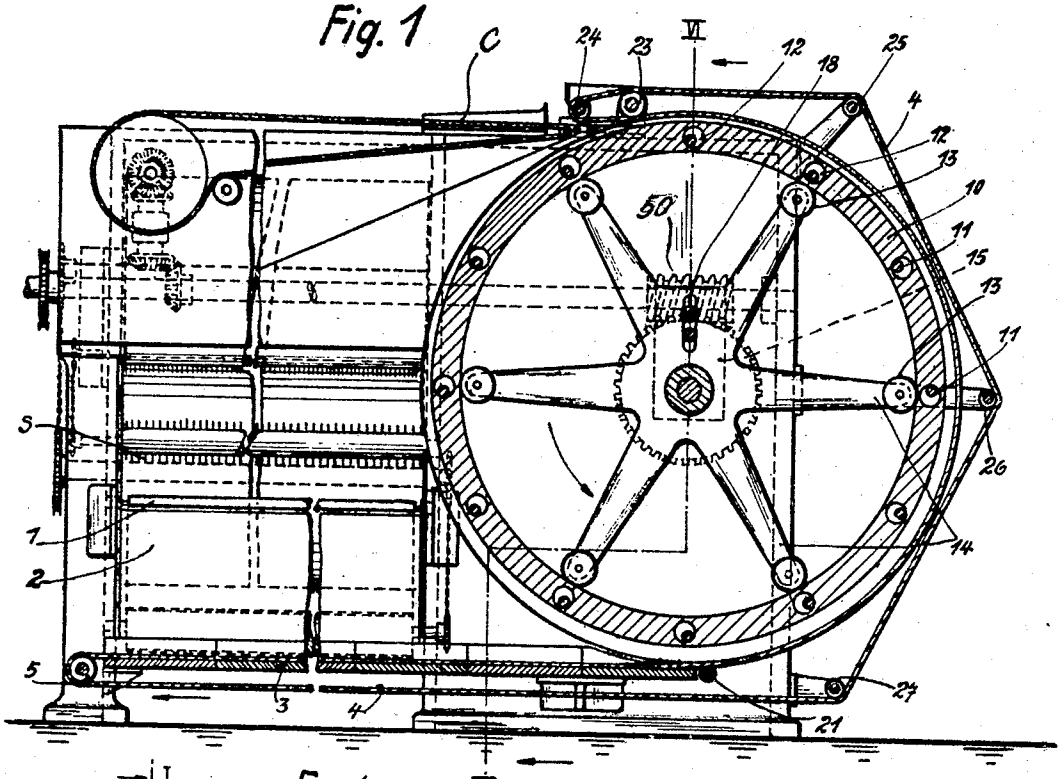
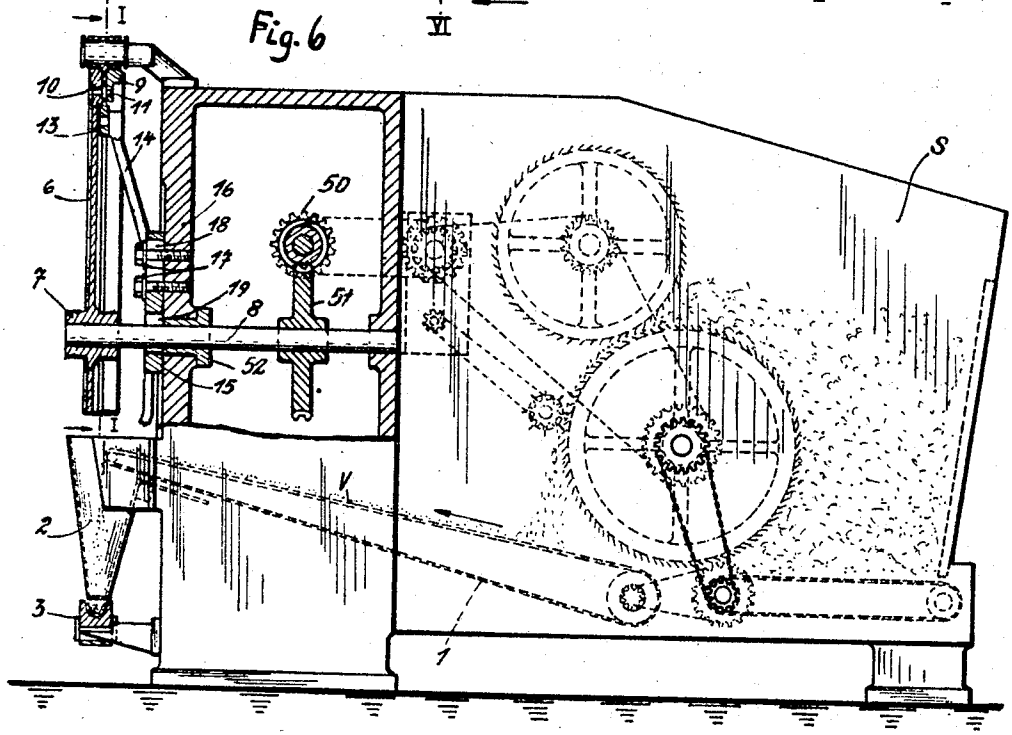


Fig. 6



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Fig. 2

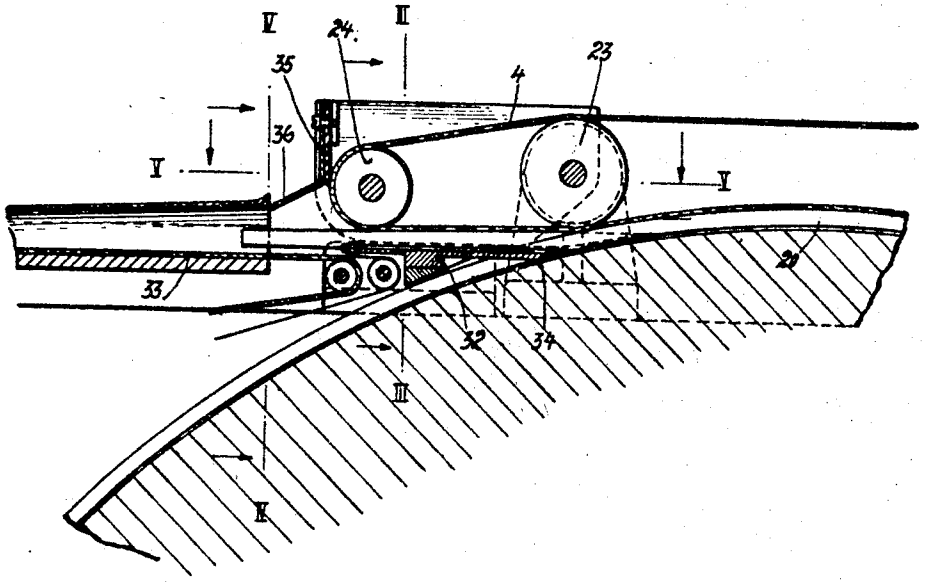


Fig. 3

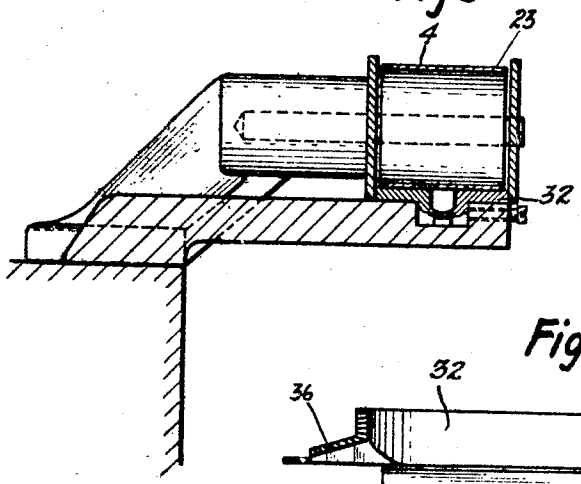


Fig. 4

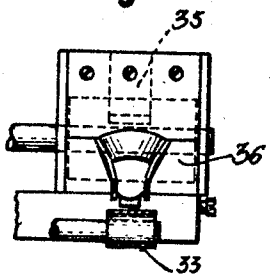
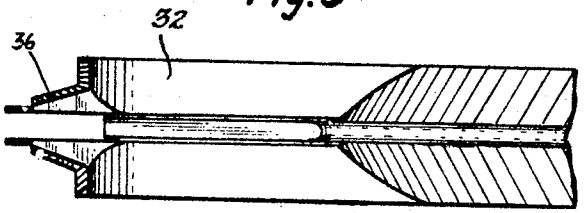


Fig. 5



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Fig. 7

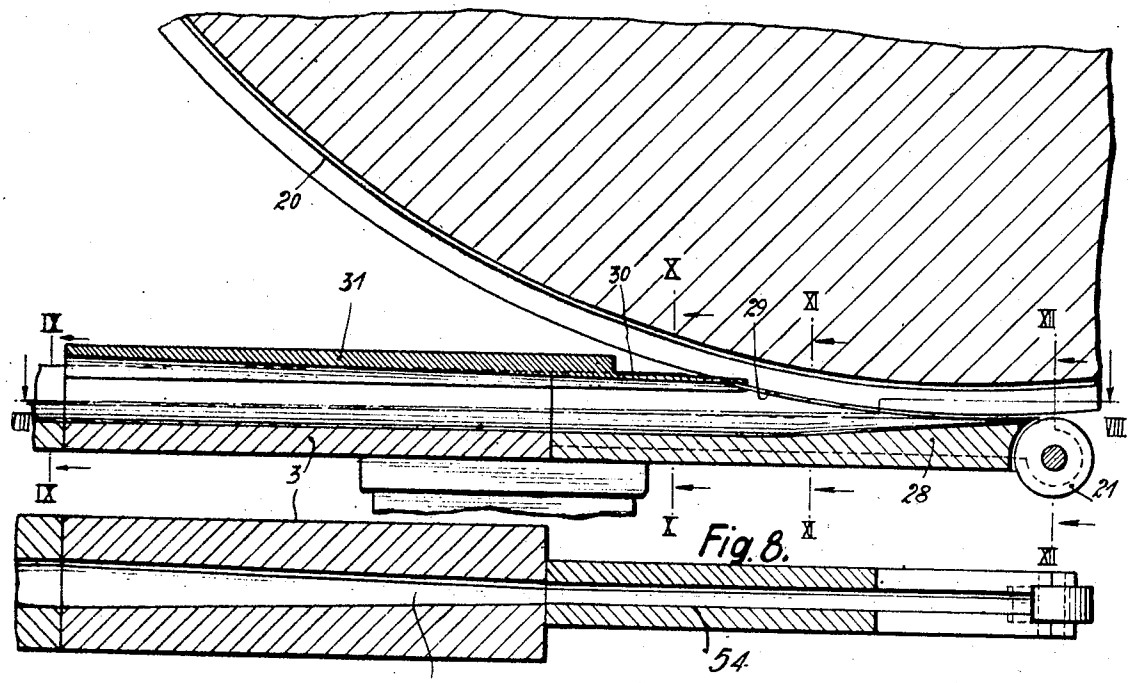


Fig. 8.

Fig. 9.

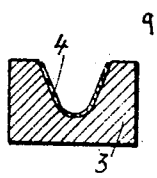


Fig. 10.

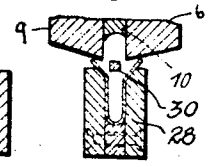


Fig. 11.

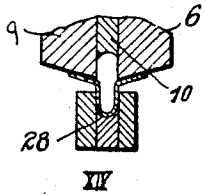


Fig. 12.

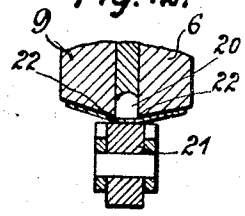


Fig. 13

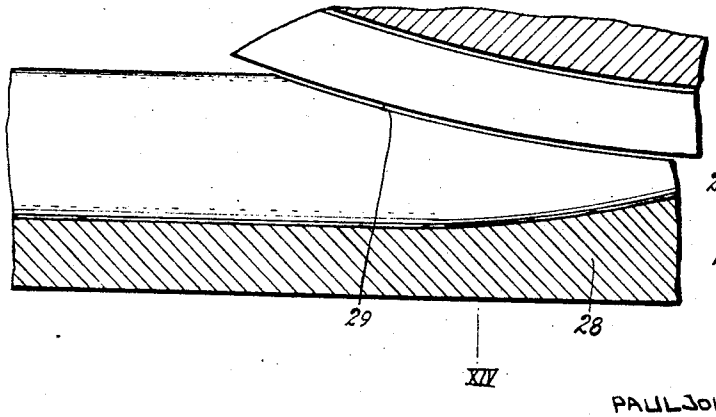
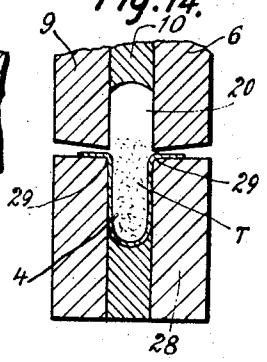


Fig. 14.



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UNITED STATES PATENT OFFICE

2,243,703

TOBACCO ROD FORMING MACHINE

Paul Johannes Herrmann, Dresden, Germany, assignor, by mesne assignments, to J. C. Muller N. V., Rotterdam, Netherlands

Application June 7, 1938, Serial No. 212,226
In Germany June 12, 1937

7 Claims. (Cl. 131—84)

The present invention relates to improvements in tobacco rod forming machines. The invention relates more particularly to the form of tobacco rod forming machine used in cigarette manufacture in which loose tobacco is preliminarily formed into a rod and is then conducted around a guiding and compacting disc after which it is fed into the wrapping device of the cigarette machine.

An object of the present invention is to provide means for conducting the preformed tobacco rod onto the compacting and guiding disc without breaking the rod.

Another object is to provide means for efficiently and smoothly removing a compacted rod from the disc.

A further object is the improvement of the guiding and compacting disc used in these machines so that the conveyor belt which carries and preforms the tobacco rod engages the periphery of the disc tighter to improve the compacting of the tobacco.

A still further object is an improved construction of compacting and guiding disc which permits of variation in the degree of compactness obtainable in the machine.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claims appended hereto.

In the drawings, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a vertical section taken on the line I—I of Figure 6.

Figure 2 is an enlarged detail view of a portion of the device of Figure 1.

Figure 3 is a vertical section taken on the line III—III of Figure 2.

Figure 4 is a vertical section taken on the line IV—IV of Figure 2.

Figure 5 is a horizontal section taken on the line V—V of Figure 2, some of the parts being removed.

Figure 6 is a vertical section of the device taken in the region of the line VI—VI of Figure 1.

Figure 7 is an enlarged detail view of a portion of the device shown in Figure 1, the conveyor belt being removed.

Figure 8 is a horizontal section taken on the line VIII—VIII of Figure 7.

Figures 9 to 12 are vertical cross-sections taken respectively along the lines IX—IX, X—X, XI—XI, and XII—XII of Figure 7.

Figure 13 is a further detail of the device shown in Figure 7 on a more enlarged scale, and

Figure 14 is a vertical section taken on the line XIV—XIV of Figure 13.

Referring now to Figures 1 and 6, tobacco is fed through a suitable well known apparatus into a spreader S which deposits a layer or fleece of tobacco V upon the upper run of a conveyor belt 1. The belt 1 discharges into the upper end of a guiding chute 2 the opposite walls of which converge towards the lower open end thereof. Below the chute 2 is a guide 3 the upper face of which is formed with a U shaped channel. A conveyor belt 4 is entrained over the pulley 5 and passes over the guide 3, the belt conforming in shape to the channel of the guide. The belt 4 presents, therefore, a moving channel in which the tobacco fleece V is deposited. This channel causes the tobacco to assume a rod shape although the rod is at this stage quite loose.

As shown in Figure 1, the conveyor belt 4 takes the tobacco which is preformed into the rod and conducts it to the guiding and compacting disc. This disc is composed, as best seen in Figure 6, of an outer disc 6 the hub 7 of which is mounted on the shaft 8 to be driven thereby. The shaft 8 is driven by means of a worm 50 and a pinion 51 which are supplied with power from the general operating motor for the machine. The shaft 8 is journaled in the frame 16 of the machine and a suitable bearing 52 is provided. The guiding disc has, in addition to the disc 6, an annular ring 9 which is drivingly connected to the disc 6 by means of the bolts 11. The disc 6 and ring 9 are spaced apart and between them is located the cam ring 10 which is provided with enlarged apertures 12 through which the bolts 11 pass. The connection of the disc 6 and ring 9 is such that the cam ring 10 may have free sliding movement therebetween. The inner edge of the cam ring 10 is engaged by a plurality of rollers 13 each of which is mounted at the outer end of an arm of the star bracket 14. The cam ring is therefore carried upon these rollers 13. The bracket 14 is fixedly mounted to the frame 16 by means of bolts 17 which pass through a slot 18 in the central portion of the bracket. In order to impart a camming movement to the ring 10 the bracket 14 is mounted eccentrically with respect to the shaft 8. The highest point is located at the top of the disc. The degree of eccentricity of the cam ring is variable within limits since the center of the bracket 14 has the slot 18 within the limits of which this adjustment may be made. The center of the

bracket 14 is further provided with a large aperture 19 through which the shaft 8 can pass freely in all positions of adjustment of the bracket 14. It will now be seen that the guiding and compacting disc consists of the three members, the disc 6, ring 9 and cam ring 10 which rotate together due to the interconnection of the bolts 11 while the cam ring 10 also receives a radial movement by reason of the fact that it is supported eccentrically with respect to the axis of the disc 6. Figure 14 shows particularly the manner in which the three parts of the disc cooperate to form a peripheral groove 20. The edge of the disc 6 and the facing edge of the ring 9 form the opposite sides of the groove while the peripheral face of the cam ring 10 forms the floor of the groove. For this object the periphery of the cam ring 10 has a concave shape. As the cam ring 10 slides relatively to the other parts of the disc the depth of the groove 20 will be changed.

Referring again to Figure 1, the belt 4 passes around the guiding and compacting disc for approximately one-half of its circumference. The peripheral groove 20 of the disc is aligned with the U-shaped channel formed in the top of the guide 3. Since the tobacco is placed on the top of the belt 4 the loosely formed rod of tobacco is placed into the groove 20 of the disc as the belt follows onto the outer surface of the disc. As the disc rotates in the direction of the arrow the cam ring 10 is projected radially outwards so that the loose tobacco rod is compacted and compressed against the belt 4. At the uppermost part of the disc the compacted rod is removed and taken into the cigarette making device which is generally designated at C. This device forms no part of the invention.

It has been the experience of the users of machines of this general type that the loosely formed tobacco rod does not arrive at the groove 20 in the disc in its best condition due to the fact that it must be lifted out of the groove and transferred into another groove. In Figures 7 to 13 applicant's solution to this problem is shown. The guide 3 is provided with an end section 28 which extends to the lowermost edge of the disc. This part 28 has a channel which communicates with the channel of the guide 3. The bottom of the groove in the member 28, however, rises towards the upper edge of the guide. Furthermore, the groove in the top of the guide 3 adjacent this end converges as shown in Figure 8. In the region of the tobacco feeding chute 2 it is necessary to have the groove relatively wide because of the looseness of the tobacco. The groove 20 of the compacting disc is however much narrower in conformity with the final dimensions required for the tobacco rod. For this reason, the groove in the upper part of the guide 3 is tapered at 53 and is followed by a straight portion 54 of the same dimensions as the groove 20. As the belt 4 travels along the upper surface of the guide 3 it strikes the constricting portion 53 and is urged out of the guide to some extent. When the belt passes into the portion 28 the floor of the groove begins to rise and the belt is forced gradually into a flat condition on top of the guide in which condition it passes onto the disc. The tobacco rod is meantime supported and guided by the guide 31 which extends over and about the belt on top of the guide 3. A forward extension 30 of the guide 31 projects slightly into the groove 20 of the disc. The guide 31 has its under surface sloping downwardly towards the section 28 of the guide to hold the loose tobacco together as it is being conveyed into the groove 20. The belt 4 overlaps the edge 29 of the groove in the section 28 more and more as the floor of the groove rises. The tobacco rod follows the line indicated in dot and dash in Figure 7 and assumes a tangent to the disc. Since the rod meets the disc at a tangent there is no bending of the rod but it gradually conforms to the circularity of the disc after it leaves the meeting point. The edges 29 of the channel in the section 28 serve to insure a restriction of the width of the rod on the belt by maintaining a sharp edge at opposite sides. The width of the tobacco rod T at this point is less than the width of the groove 20 so that the tobacco can pass without hindrance thereinto. The belt 4 is supported adjacent the outer end of the section 28 by means of the roller 21 which presses the belt tightly against the periphery of the disc. This roller serves to force the loose tobacco rod tightly into the groove 20 after which time the tautness of the belt furnishes sufficient resistance for the compacting action.

Figures 10 to 12 illustrate the contour which is given to the peripheral surfaces of the disc 6 and the ring 9. These surfaces are made to diverge toward the axis of the disc so that the edges 22 of the groove 20 are the highest points on the periphery of the disc. This provision has a twofold result, first of all, it places the greatest tension of the belt 4 directly upon the tobacco in the groove 20; secondly, it dispenses with the need for flanges or other means for retaining the belt on the disc since lateral movement is effectually prevented. Figures 10 to 12 show in consecutive steps the manner in which the belt 4 places the loose tobacco rod in the groove 20 and then conforms itself to the peripheral edge of the disc. From Figure 12 the advantages just described will become apparent.

Now, as the disc is rotated the cam ring 10 moves radially nearer to the inner surface of the belt 4 and compresses the tobacco rod thereagainst. The degree of movement of the ring 10 is adjusted so that at the top of the disc the tobacco rod will be of the necessary dimensions and compactness for immediate rolling into a cigarette.

At the top of the disc, as shown in Figures 2 to 5, there is provided a bridge 32 which has a spring finger 34 engaging the peripheral surface of the cam ring 10 to remove the tobacco rod from the groove 20. The belt 4 is passed over the roller 23 and about the roller 24. The rod which is picked from the groove 20 by the finger 34 slides along the upper surface of the bridge 32 and is passed into the cigarette forming device C where it is wrapped in the usual manner. The rollers 23 and 24 are so spaced that they produce a short run of the belt 4 directly over the surface of the bridge 32. This keeps the tobacco rod under compression until it is delivered onto the shaper belt 33 of the wrapping machine. This prevents any possible breakage of the rod or loosening of the fibres of tobacco. The bridge and other upper structure is enclosed by a shield 36 which holds a scraper 35 in engagement with the belt 4 to remove all tobacco particles which might be stuck to the belt. These particles then fall onto the rod and onto the conveyor 33 and are carried into the wrapping machine. As shown in Figure 5 the shield 36 has downwardly extending sides which converge towards the wrapping machine. This also assists

in the carrying of loose particles of tobacco along with the rod.

The above described device provides a construction of rod forming machine in which a constant and unbroken rod of adjustable compactness and diameter may be delivered directly to the wrapping machine. The loss of tobacco and the number of imperfect cigarettes are greatly reduced and those cigarettes which are produced are of a more uniform character as to their tobacco filler.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims:

What is claimed is:

1. A device for forming tobacco rods having a conveyor belt, a channel-shaped guide for said belt to whose shape the belt conforms for shaping loose tobacco into rod form, and a rotatable guiding disc with a peripheral groove aligned with said belt and guide to receive the tobacco rod, said belt being entrained in flat condition over a portion of said disc, said channel-shaped guide having its channel converging adjacent said disc to the width of the said groove in the disc, the said channel further decreasing in depth towards the end of said guide adjacent the disc to strike the disc at a tangent, whereby said belt gradually leaves said guide to pass in flat condition onto said disc without interruption.

2. A compacting device comprising a disc, a ring fixed around the periphery of said disc and being axially spaced therefrom, a cam ring between said disc and ring fixed for rotation therewith but free to slide therebetween in a radial direction, said disc and ring forming opposite sides and the peripheral edge of said cam ring forming the floor of a peripheral groove about the compacting device, the peripheral edges of said disc and ring being beveled outwardly from the adjacent sides of said disc and ring, a flexible conveyor belt for lying against the peripheral edges of said disc and ring and spanning said peripheral groove, and a guide member adjacent said disc and having a groove to receive said belt and cause it to assume a trough form, said guide member haying outwardly divergent walls diverging toward the beveled peripheral edges of said disc and ring for guiding the opposite edge portions of the belt in opposite directions against said beveled peripheral edges of said disc and ring to cooperate in transforming the belt from the trough to substantially flat form in its passage from the trough to the disc.

3. A device for forming tobacco rods having a conveyor belt, a channel-shaped guide for said belt, said belt conforming to the shape of said guide for shaping loose tobacco into rod form, a rotatable guiding disc with a peripheral groove aligned with said belt and guide to receive the tobacco rod, said disc having peripheral surfaces at opposite sides of said groove positioned to receive the side edges of the belt as said belt emerges from the channel in said guide member, said peripheral surfaces of the disc at opposite sides of its peripheral groove being so constructed and arranged that the opposite side edges of the emerging belt will be directed outwardly and in opposite directions and gradually into a substantially flat condition across the periphery of said disc and its groove, said belt being entrained over a portion of said disc.

4. A device for forming tobacco rods having a conveyor belt, a guide underlying a portion of said belt, said guide having a channel in its upper surface to which said belt conforms to form loose tobacco into rod form, a compacting disc having a peripheral groove aligned with said belt and guide, said belt being entrained over said disc for a portion of its circumference whereby the rod formed tobacco is pressed into said peripheral groove, a shaper belt for receiving compacted tobacco from said compacting disc, said shaper belt being also aligned with said disc, and a bridge between said disc and said shaper belt, said bridge including a scraper engaging the floor of the peripheral groove of said disc to remove compacted tobacco therefrom.

5. In a device for forming tobacco rods, a compacting disc comprising a driven disc, a ring of equal diameter to said disc, fastening means between said ring and said disc to support said ring in axially spaced relation to the disc and to fix said ring to rotate with the disc, a cam ring slidably positioned between said ring and disc, said fastening means passing through said cam ring to entrain said cam ring for rotation but permitting radial sliding of the cam ring with respect to said disc and ring, and a bracket with a plurality of radiating arms carrying at their ends rollers engaging the inner edge of said cam ring, said bracket being fixed to support said cam ring eccentrically with respect to said disc and ring whereby upon rotation of the disc and ring said cam ring is moved radially outwards.

6. In a tobacco rod forming machine, a conveyor belt adapted to receive a charge of tobacco at one end of the run, a guide beneath the run of the belt to support the same and having a longitudinal groove therein for shaping the belt into trough form, said groove tapering in depth and width to initially shape the tobacco into loose rod form, a compacting disc disposed over the outer end of the guide and having a peripheral channel therein, means for directing the belt from the outer end of the guide in flat condition about a portion of the circumference of the compacting disc to compress the loosely formed rod of tobacco into the channel of the disc and provide a compacted tobacco rod, and means for taking off the compacted tobacco rod from the disc at the end of the run of the belt.

7. In a tobacco rod forming machine, a compacting disc having a peripheral channel therein, a belt having a run engaging flatly about a portion of the disc over the channel, a grooved guide supporting said run of the belt in trough form prior to engagement with the disc to receive loose tobacco thereon, said groove in the guide tapering in depth toward the disc to transfer the loose tobacco from the belt into the channel of the disc for compressing the tobacco into compacted rod form in the channel beneath the flat portion of the belt, and means for taking the compacted rod of tobacco from the disc.

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