Jan. 12, 1943. A. V. WILLIAMS 2,308,323

CIGARETTE MACHINE

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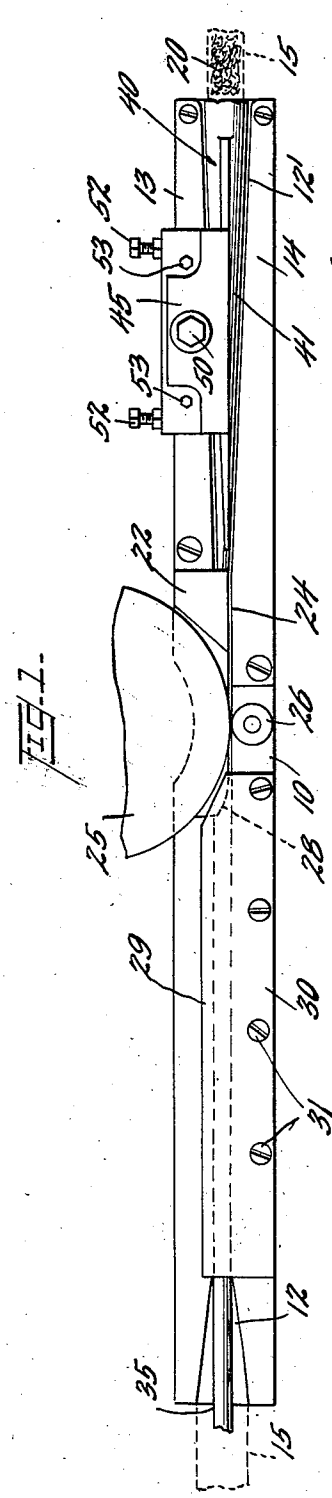


FIG. 1.

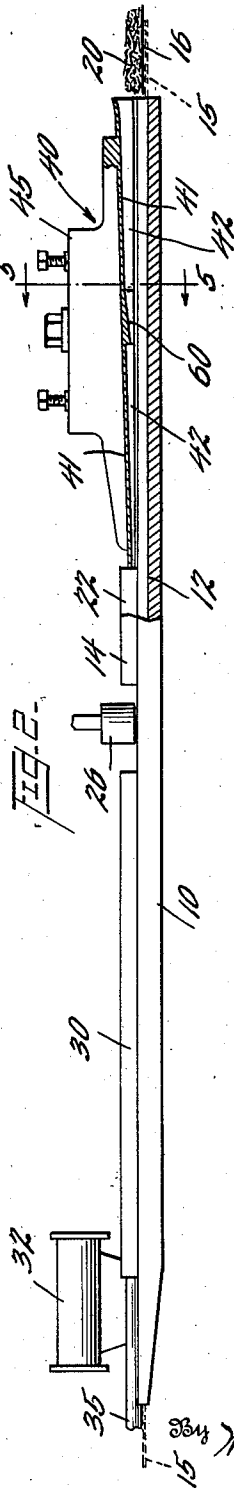


FIG. 2.

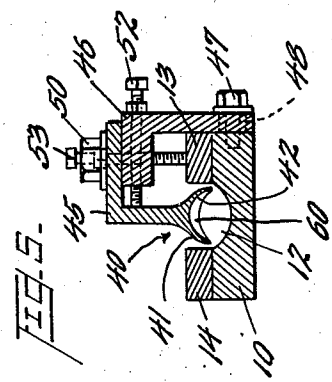


FIG. 5.

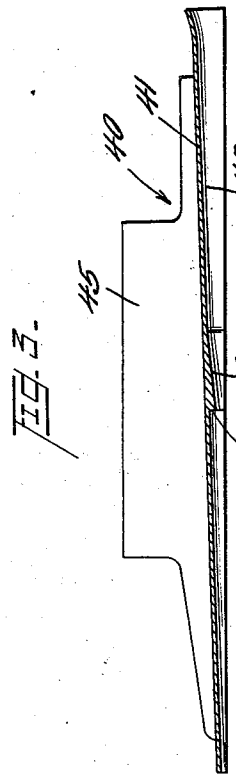


FIG. 3.

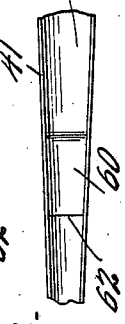


FIG. 4.

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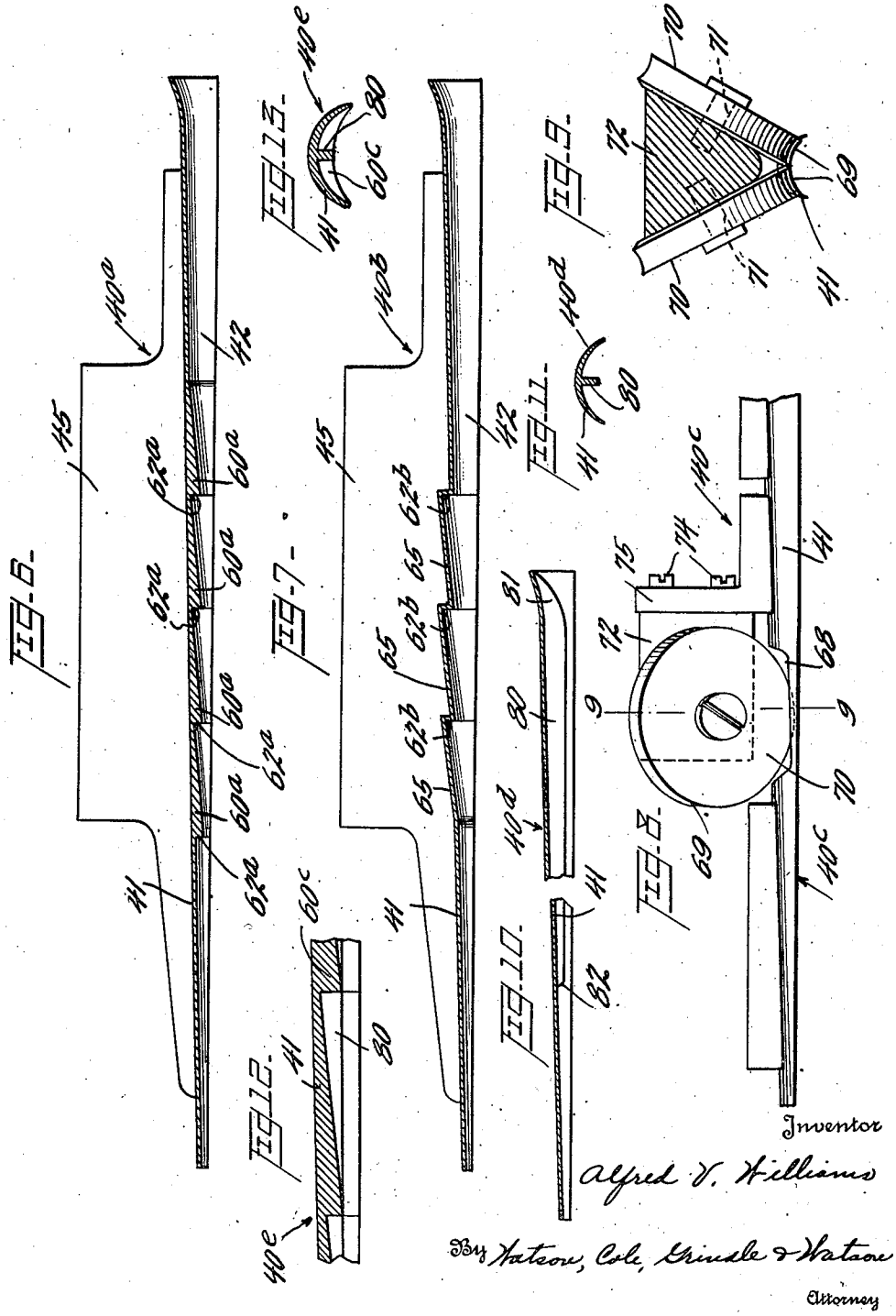
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CIGARETTE MACHINE

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Patented Jan. 12, 1943 2,308,323

UNITED STATES PATENT OFFICE

2,308,323

CIGARETTE MACHINE

Alfred Valentine Williams, Richmond, Va., assignor to Molins Machine Company, Inc., Richmond, Va., a corporation of New York

Application October 10, 1939, Serial No. 298,830

9 Claims. (Cl. 131—84)

This invention relates to the manufacture of cigarettes and more particularly to the forming of the rod in a continuous rod cigarette making process.

The invention has for its general objects the provision of novel and improved methods and apparatus for forming a cigarette rod with a minimum of disturbance of the original haphazard arrangement of the shreds of the tobacco filler as showered from the hopper to provide the longitudinally moving stream from which the rod is formed.

Broadly considered, the successive steps in the continuous rod process are as follows: The tobacco filler in the form of loose vermicular shreds is deposited upon an endless conveyor tape, moving through a filling channel, to form a narrow continuous stream of tobacco shreds which are disposed in a completely irregular or haphazard manner. While in the filling trough or channel the stream of filler is usually, although not in all cases, passed beneath a compacting wheel in order to give a preliminary compression to the tobacco to prevent it being piled too high on the conveyor, the peripheral speed of the wheel being equal to the linear speed of the tobacco stream so that the irregular interlacing or mingling of the shreds is not altered.

The paper wrapper is unreeled from the bobbin in a continuous strip and is either fed to the tape conveyor running in the filling channel or introduced beneath the tobacco stream at a point just beyond the end of that channel. The stream of shredded tobacco filler supported upon the paper strip is then carried through the rod forming channel or garniture preferably by means of a second endless tape conveyor. The garniture is provided with a tapering channel of diminishing substantially U-shaped cross-section through which the tape, the paper, and the filler move, and by means of which there is effected the progressive forming of the paper and filler into the cylindrical cigarette rod. The garniture block is provided with spaced plates or flanges which effect the final folding and overlapping of the edges of the wrapper, and is also equipped with paste applying and drying devices for effecting the sealing of the rod.

Over the initial converging portion of the forming channel there is disposed a compression tongue having a tapering or convergent substantially semiconical undersurface, complementary to that portion of the forming channel in providing a narrowing throat into which the tobacco stream is fed. This compression tongue is thus practically the only element which comes into frictional contact with the tobacco itself during its travel and it is important that this contact with its resulting drag on the tobacco stream shall not disturb or disarrange the irregular and haphazard formation of the tobacco shreds nor tend to align these shreds longitudinally of the axis of the stream. Prior theories and conceptions of the problem have gone upon the premise that the working surface of the tongue should be as smooth, even, and unbroken as possible, with the idea of reducing the friction or drag to an absolute minimum; but the drag, even in the case of a perfectly smooth surface, has been found to be appreciable, and positive evidences of wear can be detected upon an inspection of a tongue which has been in use for some time.

The dislocation and tendency toward alignment of the shreds or particles has a number of disadvantages, among which may be mentioned the chance of non-uniformity in the mass or density of the filler in the completed cigarette, and the tendency of the naturally curly or vermicular shreds, when straightened out or aligned, to resume their original configuration. This effect is variable and depends upon the nature and condition of the tobacco, the state of the atmosphere, and the methods of manufacture pursued.

I have discovered that the dislocation and strain of the shreds of the tobacco stream may be minimized by certain modifications of the compression tongue in accordance with the present invention. Contrary to preconceptions, it has been found that the application of certain undulations or interruptions in the working surface of the tongue has a beneficial effect upon the tobacco stream in preventing the deleterious consequences to which reference has been made. These alternate constrictions and enlargements in the tongue channel, apparently through alternately contracting and releasing the tobacco stream, allow the tension or strain and the tendency toward axial alignment of the shreds to be dissipated before the final enclosure and sealing of the rod. But, whatever the underlying theory, the several expedients forming the subject of the present invention have been effective in eliminating the difficulties and effects described, and in improving the quality of the finished product.

It is therefore a more particular object of the invention to provide a compression tongue, the inner generally semiconical surface of which is modified by the application thereto of either stationary or movable protrusions which constrict

the cross-sectional area of the channel of the tongue, each protrusion followed by an enlargement, recess, or cut-away portion, which permits an expansion or release of the stream after the disturbance or compression caused by the constriction. In certain embodiments there may be provided cut-away portions or recesses only, let into the conical wall; and whether one or more than one of such recesses or of such constrictions shall be employed, depends upon the nature of the tobacco and other variable factors.

Movable or rotatable elements projecting through the walls of the tongue feature certain other illustrated embodiments of the invention and, obviously a number of other similar expedients may be suggested by the present specification and drawings as falling within the broad scope of the present invention.

In the drawings:

Figure 1 is a fragmentary plan view of the rod forming portion of a cigarette machine embodying the principles of my invention;

Figure 2 is a view of the same section of the machine in side elevation, part being shown in vertical longitudinal section;

Figure 3 is a longitudinal vertical sectional view on a somewhat enlarged scale of the compression tongue to which the present improvement is applied;

Figure 4 is a fragmentary bottom plan view of a portion of this tongue;

Figure 5 is a view in transverse vertical section taken on line 5—5 of Figure 2;

Figure 6 is a longitudinal vertical section, similar to Figure 3, but showing another embodiment of the invention on a further enlarged scale;

Figure 7 is a similar view of still another embodiment of the invention;

Figure 8 is a fragmentary view in side elevation of a further embodiment of the invention;

Figure 9 is a transverse sectional view taken on line 9—9 of Figure 8;

Figure 10 is a broken view in longitudinal vertical section of a still further modification;

Figure 11 is an end view of the same;

Figure 12 is a fragmentary view of the midsection of another embodiment; and

Figure 13 is a transverse vertical sectional view of the same embodiment.

For convenience in describing the invention, reference is made to the embodiments thereof illustrated in the drawings and specific language is used. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, various further modifications and alterations of the illustrated embodiment being contemplated such as would occur to one skilled in the art.

The rod forming member or garniture, and its accessory devices are shown in Figures 1 and 2 of the drawings in somewhat diagrammatic fashion. The garniture proper comprises the elongated block 10 provided with a channel 12 extending throughout the length thereof and being of substantially U-shaped cross section. The inlet end of the channel 12 is considerably wider than the intermediate portion and the channel tapers gradually in width as at 12' from the right hand or inlet end to an intermediate point in order to provide a converging passageway for effecting the gradual narrowing and shaping of the tobacco stream to form the cylindrical cigarette rod. Upon opposite sides of the upper surface of the block 10 adjacent the converging channel 12' there are secured the plates or blocks 13 and 14, the inner edges of these blocks being inclined to the same degree as the convergence of the walls of the channel 12'.

An endless tape conveyor indicated at 15 passes through the channel 12 and carries upon its upper surface the continuous strip of cigarette paper or wrapper 16. Prior to reaching the right hand end of the garniture illustrated in Figures 1 and 2 there will have been deposited upon the wrapper strip 15 a stream of shredded tobacco filler indicated in the drawings at 20. This filler may be deposited in any suitable manner as for example by being showered down from a hopper upon a conveyor tape or upon the paper wrapper which is fed through a filling channel, such as for example as shown in the patent to W. E. Molins, No. 2,149,924.

From the tapered converging groove or channel 12' the tape 15 with its superposed wrapper 16 and stream of tobacco 20 passes into the narrower portion of the channel 12 and under a plate 22 which provides an arched roof for the channel and which serves to fold one edge of the wrapper strip over the top of the tobacco stream which is now of a substantially cylindrical form approximating the size and shape of the cigarette rod desired. The other side edge of the wrapper strip passes vertically into the slot 24 between the plate 14 and the block 22. Beyond this point the plate 14 terminates and the block 22 is cut away upon its upper surface to accommodate the cooperating gumming roller 25 and presser roller 26. After the adhesive has been applied to one side of the upstanding edge of the wrapper this edge is folded down upon the cigarette rod by the cooperation of the curved and beveled surface 28 of the block 22 and the overlapping flange 29 of the plate 30 which is secured to the garniture as by means of the fastening elements 31. Beyond the end of the plate 30 there is disposed a heating member 32 (shown in Figure 2) which effectively dries the adhesive and permanently seals the cigarette rod which emerges from the garniture as shown at 35 ready to be severed into appropriate lengths, delivered from the machine, and packaged for distribution and sale.

Above the converging portion 12' of the forming channel 12 in the garniture there is disposed a compression tongue 40 having a tapered body portion 41 of substantially semiconical configuration, this resulting in the formation of an inverted U-shaped groove or trough 42 of diminishing cross-sectional area upon the underside of the tongue. The groove or trough 42 thus forms in cooperation with the channel portion 12' a narrowing or converging throat for the reception and the shaping of the stream of tobacco 20 and its wrapper 16 into cylindrical rod-like form, by the time the stream reaches the end of the tongue adjacent the block 22.

The compression tongue member 40 is provided with an inverted L-shaped supporting flange 45, the horizontal portion of which overlies the horizontal flange of an inverted L-shaped bracket 46, the vertical flange of which is secured to the garniture block 10 as by means of the bolts 47 passing through slots 48 in the member 46. A bolt 50 serves to secure the supporting flange 45 of the tongue to the bracket 46 and the horizontal position of the tongue member 40 with respect to the garniture is adjustable by means of the set screws 52. The vertical position of the bracket 46 with relation to the garniture may be

regulated by means of the set screws 53 which bear upon the upper surface of the plate 13.

As showered upon the conveyor in the filling channel the shreds in the tobacco stream extend in all directions in a thoroughly irregular and haphazard manner. As already pointed out, it is highly desirable to maintain this irregular and haphazard mingling of the shreds of tobacco in the cigarette rod and in the eventual cigarettes. Heretofore, the surface of the groove or channel 42 of the compression tongues has been made perfectly smooth and of a regularly graduated taper in order to compress the upper portion of the tobacco stream being carired through the garniture upon the conveyor so that it will be reduced, along with the lower portion of the stream passing through the forming channel upon the conveyor tape, to cigarette diameter. Regardless of how smooth the groove in the compression tongue has been formed, there is always some amount of drag upon the upper surface of the tobacco stream which causes a certain amount of displacement of the uppermost shreds or particles relative to the shreds or particles comprising the lower portion of the stream which, being supported upon the conveyor tape and cigarette wrapper, have no frictional contact with the forming channel in the garniture block. The dislocation caused by the frictional drag of the compression tongue tends to cause a straightening out or axial alignment of the shreds, and this results in varying somewhat the mass or density of the cigarette filler, and also in placing the naturally curly shreds under tension or internal strain which causes them to tend to resume their original configuration after the cigarette rod is severed. This tendency is more pronounced with some types of tobacco than with others, and also varies in accordance with the condition of the tobacco and of the atmosphere.

Figures 2, 3, 4 and 5 illustrate one embodiment of the invention by means of which this tendency of the shreds of the tobacco filler to become dislocated and aligned with respect to the longitudinal axis of the stream, is substantially overcome. At a point intermediate the length of the body 41 of the tongue there is provided an interruption in the smooth tapered contour of the groove or channel 42 in the form of an inclined enlargement or projection 60, the cross-sectional contour of the portion 60 being substantially crescent shaped as indicated in Figure 5, the edges of the enlargement merging with the edges of the tongue. The further end of the enlargement 60 terminates on an abrupt shoulder 62 beyond which the gradual uniform taper of the groove is resumed and continued to the end of the tongue. The effect of the constriction of the groove 42 by means of the protuberance or enlargement 60 is to compress the tobacco stream at a slightly more rapid rate and then to suddenly release the compression thereon and free the stream for resumption of its relatively unstressed condition, at least temporarily until the converging walls of the channel or groove again resume their gradual compressive action.

For certain types of tobacco and under certain atmospheric conditions, one of such constrictions of the groove 42 will be sufficient to correct the possible tendency toward dislocation or alignment of the shreds, but in certain cases it has been found desirable to increase the number of such constrictions in order to provide a series of intermittent compression and expansion effects on the tobacco stream as provided in the tongue 40A illustrated in Figure 6 of the drawings in which four enlargements or projections 60a are provided, each one being followed by an expansion space beyond the shoulders 62a.

Another modification of the invention is shown in Figure 7 of the drawings in which a series of shoulders 62b are provided in the regularly tapered surface of the groove 42, without any preliminary constriction as afforded by the initial enlargements 60 and 60a in the preceding embodiments. Between adjacent shoulders 62b are the tapered wall sections 65 which provide recesses into which the upper portion of the tobacco streams may expand, the intermittent compressions and expansions having a similar beneficial effect upon the filler to that described in connection with the previous embodiments.

A still further modification of the tongue is shown in Figures 8 and 9 of the drawings in which the tongue member 40C is provided with a slot 68 in the upper wall of its semi-conical body portion 41. Projecting into this slot are the peripheral portions 69 of the wheels or rollers 70 which are carried on inclined axles 71 supported in the prism-shaped block 72 which is in turn secured as by means of the screws 74 to the bracket 75 carried by the body portion 41 of the tongue. In this embodiment the periphery 69 of the rollers 70 may be of a concave profile and they cooperate to provide a constriction of the groove 42 just as in the case of the previously described embodiments; but since the rollers are free to turn upon their axles during the passage of the stream of tobacco there is somewhat less drag upon the upper surface of the stream. Other types of movable protuberances forming constrictions in the groove of the compression tongue and having similar effects to the rollers 70, may be employed.

In the compression tongue 40D illustrated in Figures 10 and 11 of the drawings, the conical body portion 41 is provided with a thin longitudinal rib 80 which substantially bisects the trough of the tongue and provides means for pressing the tobacco, for a considerable period during its passage through the tongue, into more positive contact with the wrapper on the travelling belt and thus relieves the drag on the upper surface of the tobacco stream to some extent. The rib 80 is provided with a curved or tapered portion 81 adjacent its forward end to provide a smooth or streamlined portion at the entrance of the groove, and the rib terminates at 82 a short distance before the end of the tongue is reached.

The rib 80 may also be used with beneficial results in connection with the protuberances or enlargements provided upon the interior surface of the tongue, as shown in Figures 12 and 13 of the drawings. In these figures the enlargements are indicated at 60c and the modified tongue is given the general designation 40E.

Various changes and modifications may be made in the embodiments illustrated and described herein without departing from the scope of the invention as defined by the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the

sole means for feeding a stream of tobacco therethrough, a stationary compression element having a groove or trough therein of substantially inverted U-shaped cross section, disposed above said channel and cooperating therewith to compress the moving tobacco stream to the proportions of the desired rod, said element being provided upon its internal tobacco contacting surface with a succession of means for intermittently increasing the rate of compression of the tobacco stream beyond that afforded by the gradual taper of the general configuration of the working surface of the element, each of said means being immediately followed by means for abruptly relieving said increased compression before resumption of said gradual taper.

2. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary compression element having a groove or trough therein of substantially inverted U-shaped cross section, disposed above said channel and cooperating therewith to compress the moving tobacco stream to the proportions of the desired rod, said element being provided at an intermediate point upon its internal tobacco contacting surface with means for increasing the rate of compression of the tobacco stream beyond that afforded by the gradual taper of the general configuration of the working surface of the element, said means being immediately followed by means for relieving said increased compression before resumption of said gradual taper.

3. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary unitary compression element having a groove or trough therein of substantially inverted U-shaped cross section, disposed above said channel and cooperating therewith to compress the moving tobacco stream to the proportions of the desired rod, said element being provided upon its internal tobacco-contacting surface with means for temporarily relieving the compression or drag exerted upon the stream of tobacco at an intermediate point during its passage through said channel.

4. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary unitary compression element having a groove or trough therein of substantially inverted U-shaped cross section, disposed above said channel and cooperating therewith to compress the moving tobacco stream to the proportions of the desired rod, said element being provided upon its internal tobacco-contacting surface with a succession of means for intermittently relieving the compression or drag exerted upon the stream of tobacco at successive points during its passage through said channel.

5. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary compression tongue comprising a converging or tapered member of generally U-shaped cross section providing a groove or channel therein of diminishing cross-sectional area, said tongue being formed within the groove with an intermediate portion, considered in the direction of tobacco feed of abnormally decreased cross-sectional area.

6. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary compression tongue comprising a converging or tapered member of generally U-shaped cross section providing a groove or channel therein of diminishing cross-sectional area, said tongue being formed within the groove with alternate constrictions and enlargements at successive points longitudinally thereof.

7. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary compression tongue comprising a converging or tapered member of generally U-shaped cross section providing a groove or channel therein of diminishing cross-sectional area, said tongue member being formed within the groove with alternating gradual constrictions and abrupt enlargements at successive points therealong.

8. In a cigarette machine of the continuous rod type, in combination, a rod forming garniture having a converging channel of substantially U-shaped cross section therein, an endless conveyor movable through said channel and providing the sole means for feeding a stream of tobacco therethrough, a stationary compression tongue comprising a converging or tapered member of generally U-shaped cross section providing a groove or channel therein of diminishing cross-sectional area, said tongue being formed within the groove with transverse corrugations.

9. As an article of manufacture, a compression tongue for use in conjunction with the rod forming garniture of a cigarette making machine, said tongue comprising a converging or tapered member of generally U-shaped cross section providing a groove or channel therein of diminishing cross-sectional area, said tongue being provided with a narrow rib extending longitudinally thereof and substantially bisecting said groove, and said tongue being formed within the groove with an intermediate portion of abnormally decreased transverse cross-sectional area.

ALFRED VALENTINE WILLIAMS.