March 3, 1942. C. W. GOOCH, JR., ET AL 2,275,103

TOBACCO LEAF-CUTTING MACHINE

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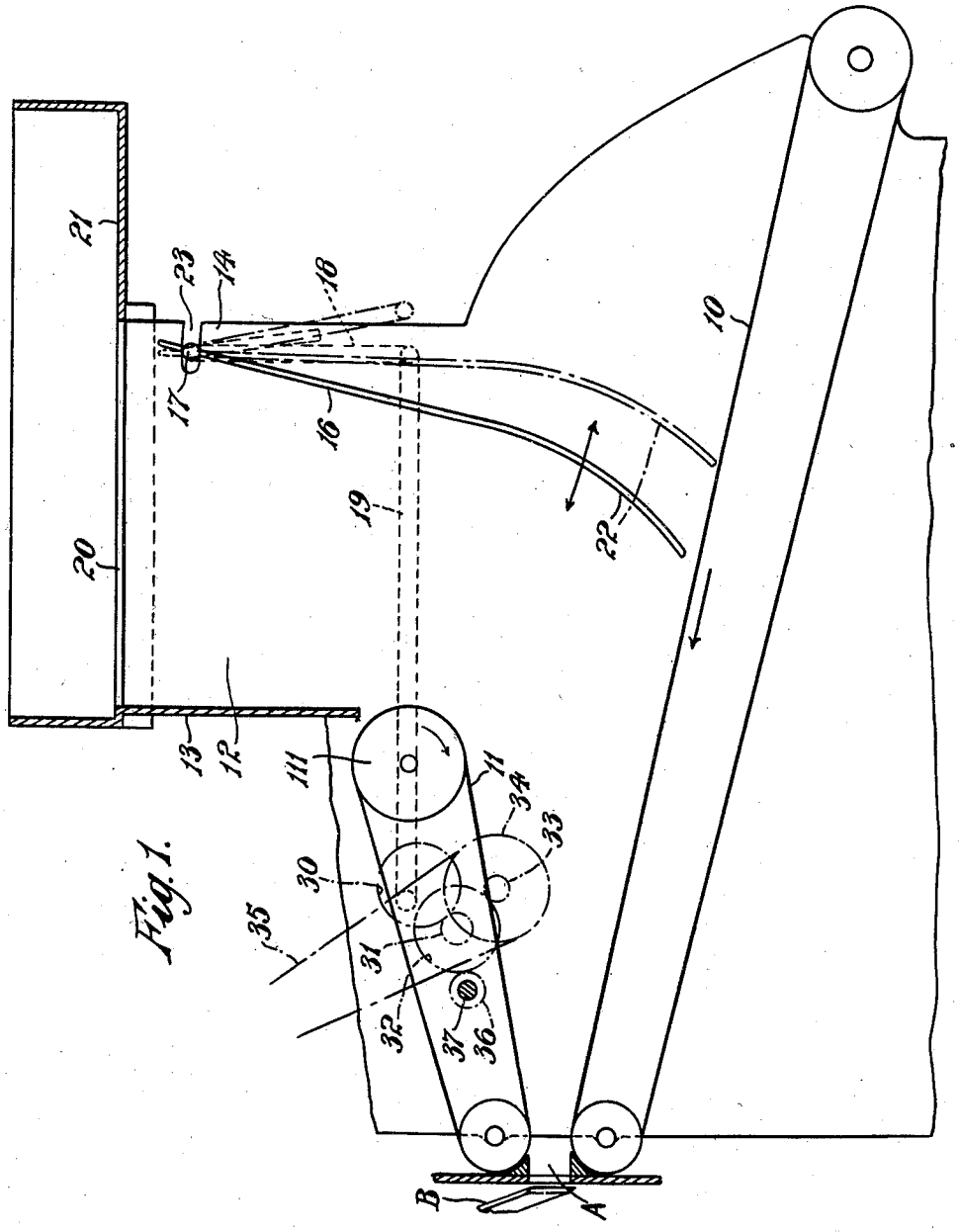


Fig. 1.

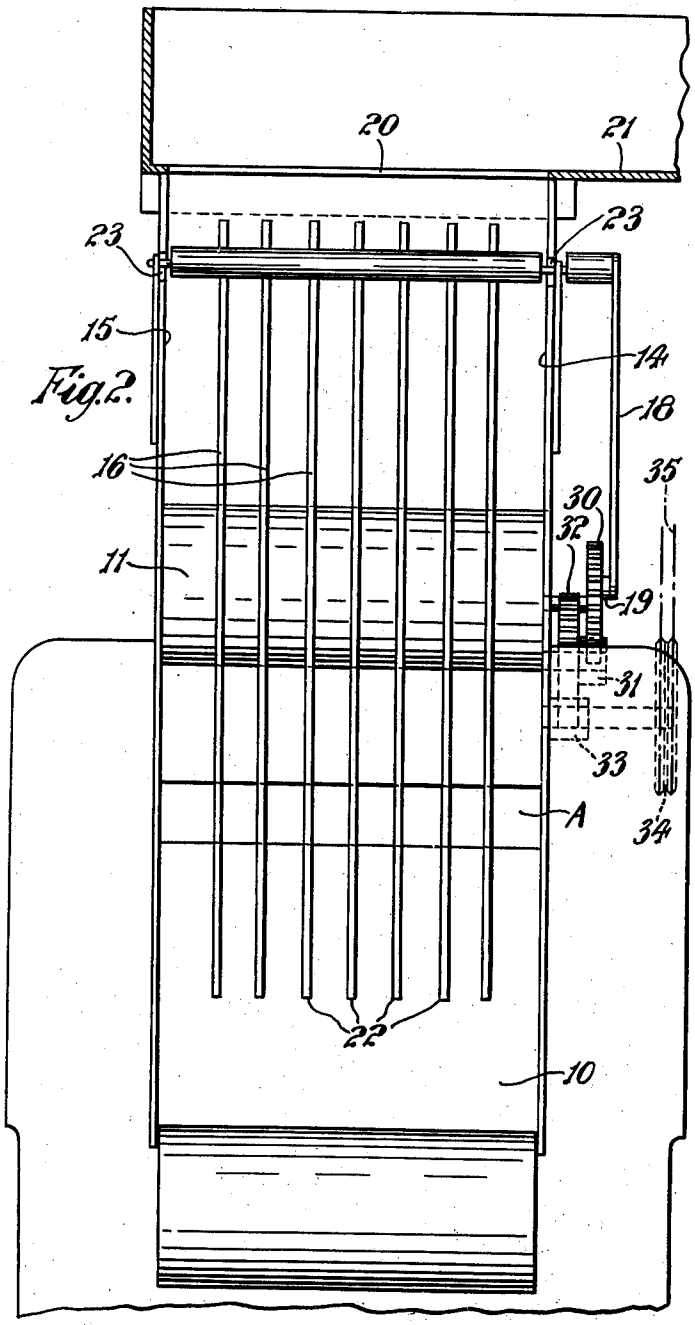
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Fig. 2.



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TOBACCO LEAF-CUTTING MACHINE

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10 Claims. (Cl. 131—81)

This invention relates to tobacco leaf cutting machines and is more particularly concerned with improvements in the leaf feeding mechanism of such machines.

In the preparation of tobacco for consumption, for example for use in cigarettes, it is customary practice to feed a mass of tobacco leaves, which have been previously cured and stemmed, through a restricted throat or mouthpiece, the mass being thereby compacted to form what is technically known as a "cheese," and to shred or cut this "cheese" by a revolving knife, whereby the tobacco is reduced to the desired comminuted form. It is common practice to feed the tobacco leaves toward the mouthpiece by means of a belt or chain conveyor, and it is customary to employ two conveying surfaces, one disposed above the other, so that the leaves may be placed on the lower conveying surface and are carried thereby beneath the upper conveying surface and thence to the mouthpiece across which the knife is moved. It is customary in this type of machine to deposit the tobacco leaves on the lower conveyor by hand, and an experienced operative is able to supply the leaves with a fair degree of uniformity. However, it is difficult for the most skillful operator to accurately estimate the weight of the leaves supplied to a unit area of the lower conveyor, particularly when the physical characteristics of the tobacco vary over a considerable range.

It is therefore an object of the invention to associate with the conventional leaf feeding structure a mechanism which is largely automatic in operation and which will tend to promote uniformity of delivery of the tobacco to the conveying means, with resultant improvement in the uniformity of the cheese and the cut of the tobacco. It is of course necessary that tobacco leaves be supplied to this automatic mechanism, and this is preferably a manual operation, but by means of the present invention we are enabled to obtain a more uniform cheese even when the tobacco is supplied by an operative of relatively little skill and experience.

More specifically, it is an object of the invention to associate with the leaf feeding means of a tobacco leaf cutting machine, a feed passage into which leaves may be introduced, the contents of the passage being continuously delivered to the leaf feeding means, the passage having associated therewith movable devices operating automatically to promote uniformity of the rate of delivery of the leaf. In the preferred form of the invention the desired object is achieved by associating with a downwardly directed passage a device for alternately applying and relieving pressure on the tobacco leaf in the passage, and gradually increasing compression of the leaf as it approaches the conventional feed means and the mouthpiece. The device is further preferably so arranged as to facilitate movement of the leaf in the direction of movement of the conveyor on delivery to the latter.

Further objects and features of the invention will be apparent from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical sectional view of a part of a tobacco leaf cutting machine; and

Figure 2 is an end elevation, partly in section, of the machine shown in Figure 1.

In order to facilitate the description of the invention, reference is made to the specific embodiment thereof shown in the accompanying drawings and detailed language is employed. It will nevertheless be understood that no limitation of the invention is thereby intended, but that variations, alterations and modifications are contemplated such as would occur to one skilled in the art to which the invention relates.

Referring to the drawings, tobacco leaves are placed upon a conveyor 10 and are moved by the conveyor 10 beneath a moving surface 11. The conveyor 10 and the moving surface 11 may be of any suitable form, that is to say, they may comprise endless bands or, if desired, they may be formed by interlocking chain elements or may be constituted by a series of rotatable rollers. The surfaces of the conveyor 10 and the moving surface 11 which engage the tobacco leaves are arranged to move in the same direction, as can be seen from Figure 1, and converge together towards a cutting aperture or mouthpiece A through which the tobacco leaves are forced by the cooperation of the conveyor 10 with the moving surface 11. Due to the convergence of the conveyor 10 and moving surface 11, the tobacco leaves are compressed into what is known as a cheese and as the cheese emerges from the mouthpiece a cutting blade B is arranged to cooperate with the cutting aperture and to sever slices from the leading end of the compressed cheese. The blade B may be operated so as to cooperate with the mouthpiece in any known manner; thus for example, the blade may be mounted for rotation across the aperture A or may be reciprocated across the aperture.

The structure thus far described is largely conventional and the details thereof form no essential part of the instant invention, which is di-

rected more particularly to mechanism for supplying tobacco leaf uniformly to a feed means and mouthpiece of the general character hereinbefore described.

The conveyor 10 travels beneath a leaf container or passage 12, which extends in a vertical or generally downward direction, and the tobacco leaves are delivered from the container to the conveyor 10 by gravity. In the construction shown in the drawings, the passage is defined by three stationary walls, one of which comprises a front wall 13, the other two walls being oppositely disposed and comprising side walls 14 and 15, and a rear wall 16 which is movable towards and away from the mouthpiece during operation of the machine. The rear wall 16, which extends transversely of the conveyor 10, comprises a plurality of downwardly directed rods or bars, as can be seen from Figure 2, the rods or bars being spaced apart from each other in a direction transverse to the direction of movement of the conveyor. The rods or bars forming the rear wall 16 are supported at their upper ends by a spindle 17 which is pivotally mounted in the side walls 14 and 15 of the container. The spindle 17 is oscillated by means of links 18 and 19 so that the lower end of the rear wall 16 is given a reciprocating movement during operation of the machine. The link 19 is eccentrically connected with a gear wheel 30 which is driven by a train of gear wheels 31, 32 and 33, a sprocket wheel 34 being secured to the shaft of the gear wheel 33 and rotated by a chain 35 which is driven from a source of motive power such as an electric motor (not shown). A gear wheel 36 meshes with the wheel 32 and a shaft 37, to which the wheel 36 is secured passes through the machine to the opposite side thereof. The gear wheels (not shown) which operate the conveyors 10 and 11 are preferably connected with the shaft 37 so that the back wall 16 may be oscillated in timed relationship with the movement of the conveyors 10 and 11.

When the machine is to be operated tobacco leaves are positioned between the conveyor 10 and the endless band 11 and the container or passage 12 is supplied with tobacco leaves, the column of leaves in the container or passage 12 thereafter being kept supplied with tobacco leaves by an operator who places the leaves into the container or passage through an aperture 20 formed in a tray or other suitable support 21, the aperture 20 being, as can be seen from the drawings, disposed above the upper opening of the container or passage 12. During the forward movement, that is, the movement towards the cutting aperture of the rear wall 16, the lower part of the rear wall, which is provided with an inwardly curved end 22 as shown in the drawings, presses the tobacco leaves between the conveyor 10 and the moving surface 11, thereby assisting the formation of the tobacco cheese. The curved end 22 of the wall 16 is struck from a center which preferably coincides with the center of a roller 111 about which the top conveyor turns. On the rearward movement of the rear wall 16 endwise pressure on the cheese is relieved and the rear wall 16 moves away from the rear end of the tobacco leaves which are being moved towards the aperture A by the conveyor 10. This rearward movement of the rear wall 16 facilitates gravitational movement of the tobacco leaves in the container or passage 12 towards the leaf receiving surface of the conveyor and resultant filling of gaps and loosely packed spaces, so that on the next forward movement of the rear wall additional leaves are pressed against the end of the mass of leaves being fed towards the mouthpiece, thereby maintaining a substantially regular feed of tobacco towards the cutting aperture and ensuring substantially uniform density throughout the moving mass.

The spindle 17 is mounted in slots 23 in the side walls 14 and 15, and is locked in position by any suitable means. By reason of the spindle 17 being mounted in the slot 23 the position of the rear wall relatively to the front wall 13 and to the cutting aperture may be adjusted.

It will be appreciated that since the rear wall is pivotally mounted at the top, the oscillation is greater at the bottom of the wall than it is at the top, and consequently, the bottom of the wall forces the leaves into the spaces between the conveyors 10 and 11 and compresses the column of leaves progressively from top to bottom, so that a column of fairly uniform density is delivered to the conveyor.

It is found important to the successful operation of the mechanism hereinbefore described that in no position of the rear wall 16 will the latter diverge downwardly from the forward wall 13. In other words, we have found that the range of movement of the rear wall 16 should not be such that the same passes through and beyond a position of parallelism with the wall 13, and it is frequently desirable to establish a range of movement of the wall 16 such that in any position thereof the walls 13 and 16 will converge downwardly. On the other hand, the walls of the passage should be so relatively disposed as to afford, regardless of the position occupied by the wall 16, only a very gradual downward convergence of the passage 12, in order to avoid any tendency to thrust the tobacco upwardly, and to ensure that movement of the tobacco in a generally downward direction will be neither impeded or unnecessarily retarded. The gradual reduction of the area of the passage 12 which is thereby established facilitates progressive compression of the tobacco leaf from the top to the bottom of the passage and the formation of a continuous felted mass, thereby minimizing the breaking of the tobacco column as the latter bends or changes direction. In general the more gradual is the transition from the downward movement of the leaves to the direction in which they are fed by the conveyors 10 and 11, the less breakage will occur, such gradual transition is aided by the curvature, in the ultimate direction of movement of the column, of the lower end 22 of the rear wall 16 of the passage. For other reasons with which we are not fully acquainted, greater uniformity of delivery of tobacco to the conveyor 10 is ensured by this arrangement.

A further very important feature in the construction described above resides in the fact that the back wall consists of rods or bars each individually mounted to a common cross pivot bar at their upper ends. This construction is one in which each bar can, due to its resiliency, yield independently of any other bar so that in the case of irregular quantities of tobacco moving downwardly those bars against which excess quantities of tobacco engage yield slightly. A beneficial result obtained by means of the present invention resides not only in the fact that the feeding of the machine is simplified, but the tobacco to form the cheese is automatically packed by this oscillating back wall, and a more consistently uniform amount is taken between the two

cooperating conveyors than is usually the case if the machine is fed by hand. When the machine is fed by hand it will be apreciated the weight per unit area of tobacco laid on the bottom conveyor depends on the skill of the operator. In the case of the automatic feed according to the present invention the weight per unit area on the bottom conveyor is more uniform. The result therefore is that the tobacco taken and compressed into the cheese when fed by means of the present invention is more even and consequently a more uniform cheese is provided, with consequent improvement in the cut of the tobacco.

It will be appreciated, however, that in order to obtain a beneficial result from the automatic feed according to the present invention it is important that the tobacco fed to the container should be packed in as even a manner as possible. With smaller leaves, however, the leaves themselves tend to pack more uniformly and to fill up the whole of the cross-section of the container. Thus where larger leaves are used a greater amount of care is necessary in filling the container uniformly. Packing tobacco evenly in the container, however, is a simpler matter than laying the tobacco directly on the bottom conveyor and relying on a uniform placing of the tobacco on the bottom conveyor.

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

1. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying means for feeding leaf tobacco toward said mouthpiece, of means defining a passage through which leaf tobacco is fed to said conveying means, and means associated with said passage for intermittently applying pressure to the leaf tobacco in said passage in a direction transverse to the direction of movement of the leaf tobacco through said passage and simultaneously in the general direction of movement of said conveying means.

2. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying means for feeding leaf tobacco toward said mouthpiece, of means defining a passage extending in a generally downward direction and leading toward said conveying means through which leaf tobacco is fed to said conveying means, and means associated with said passage for alternately applying and relieving pressure to the leaf tobacco in the passage in a direction transverse to the direction of movement of the leaf tobacco and simultaneously in the general direction of movement of said conveying means, said passage and means associated therewith being so arranged that at the times when the pressure is relieved the passage is of substantially uniform transverse area.

3. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying means for feeding leaf tobacco toward said mouth-piece, of means defining a passage extending in a generally downward direction and leading toward said conveying means through which leaf tobacco is fed to said conveying means, and means associated with said passage for intermittently applying yielding pressure to the leaf tobacco in a direction transverse to the direction of movement of the leaf tobacco in the passage and in the general direction of movement of said conveying means.

4. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying mechanism for feeding leaf tobacco toward said mouthpiece, of means defining a passage extending in a generally downward direction and leading toward said conveying mechanism through which leaf tobacco is fed to said conveying mechanism, said last named means including walls extending generally transversely of the direction of movement of said conveying mechanism, and means for effecting relative reciprocation of said walls toward and away from each other, one of said walls comprising a plurality of resilient bars supported adjacent the ends thereof remote from said conveying mechanism with the ends thereof adjacent said conveyor free to flex in the general direction of relative reciprocation of said walls.

5. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying mechanism for feeding leaf tobacco toward said mouthpiece, of means defining a passage extending in a generally downward direction and leading toward said conveying mechanism through which leaf tobacco is fed to said conveying mechanism, said last named means including oppositely disposed, relatively movable walls, one of said walls being pivotally supported adjacent the upper end thereof for swinging movement toward and away from the opposite wall, said movements toward said opposite wall being effected in the general direction of movement of said conveyor mechanism.

6. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying mechanism for feeding leaf tobacco toward said mouthpiece, of means defining a passage extending in a generally downward direction and leading toward said conveying mechanism through which leaf tobacco is fed to said conveying mechanism, said last named means including oppositely disposed, relatively movable walls, one of said walls being pivotally supported adjacent the upper end thereof for swinging movement toward and away from the opposite wall, said movements towards said opposite wall being effected in the general direction of movement of said conveyor mechanism, the range of movement of said pivotally supported wall being such that said walls converge downwardly in one extreme position of said pivoted wall, and approach, but do not exceed, parallelism in the other extreme position of said pivoted wall.

7. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying mechanism for feeding leaf tobacco toward said mouthpiece, of means defining a passage extending in a generally downward direction and leading toward said conveying means through which leaf tobacco is fed to said conveying mechanism, said last named means including oppositely disposed, relatively movable walls extending generally transversely of the direction of movement of said conveying mechanism, that wall which is remote from said mouthpiece being pivotally supported adjacent the upper end thereof for swinging movement toward and away from the opposite wall, whereby the leaf tobacco in said passage is periodically compressed and urged in the direction of movement of said conveying mechanism, the range of movement of said pivotally supported wall being such that said walls converge downwardly in one extreme position of said said pivotally supported wall, and approach, but do not exceed, parallelism in the other extreme position of said pivotally supported wall, said pivotally supported wall comprising a plurality of resilient bars extending in the direction of the length of said passage and having the lower ends

thereof free for flexure transverse to said passage.

8. In a tobacco leaf cutting machine, the combination with a mouthpiece and conveying mechanism for feeding leaf tobacco toward said mouthpiece, of means defining a passage extending in a generally downward direction and leading toward said conveying mechanism through which leaf tobacco is fed to said conveying mechanism, said last named means including oppositely disposed, relatively movable walls extending generally transversely of the direction of movement of said conveying mechanism, that wall which is remote from said mouthpiece being pivotally supported adjacent the upper end thereof for swinging movement toward and away from the opposite wall, whereby the leaf tobacco in said passage is periodically compressed and urged in the direction of movement of said conveying mechanism, the range of movement of said pivotally supported wall being such that said walls converge downwardly in one extreme position of said pivotally supported wall, and approach, but do not exceed, parallelism in the other extreme position of said pivotally supported wall, said pivotally supported wall comprising a plurality of resilient bars extending in the direction of the length of the passage and having the lower ends thereof free for flexure transverse to said passage, the lower ends of said bars being curved toward said mouthpiece.

9. In a tobacco leaf cutting machine, a mouthpiece, a container for tobacco leaves, a conveyor movable beneath the container and receiving leaves from the container for movement toward the mouthpiece, and means cooperating with the conveyor to compress the leaves carried thereby into a cheese, said container including a rear wall which comprises a plurality of downwardly directed bars spaced apart from each other in a direction transverse to the direction of movement of the conveyor, said bars being pivotally mounted at their upper ends, and means to oscillate the bars toward and away from the mouthpiece during operation of the machine.

10. In a tobacco leaf cutting machine, a mouthpiece, a container for tobacco leaves, a conveyor movable beneath the container and receiving leaves from the container for movement toward the mouthpiece, and means cooperating with the conveyor to compress the leaves carried thereby into a cheese, said container including a rear wall movable toward and away from the mouthpiece during operation of the machine, said rear-wall having the lower end portion thereof curved toward the mouthpiece.

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