March 17, 1964 S. L. MORTLAND 3,125,231

APPARATUS FOR ADMIXING STRIP TOBACCOS

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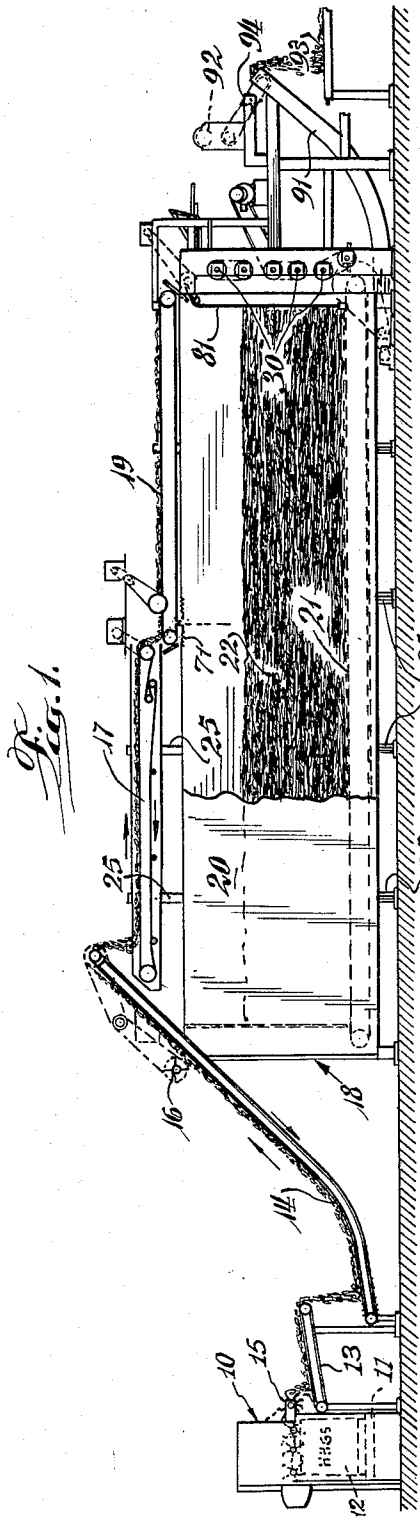

Fig. 1.

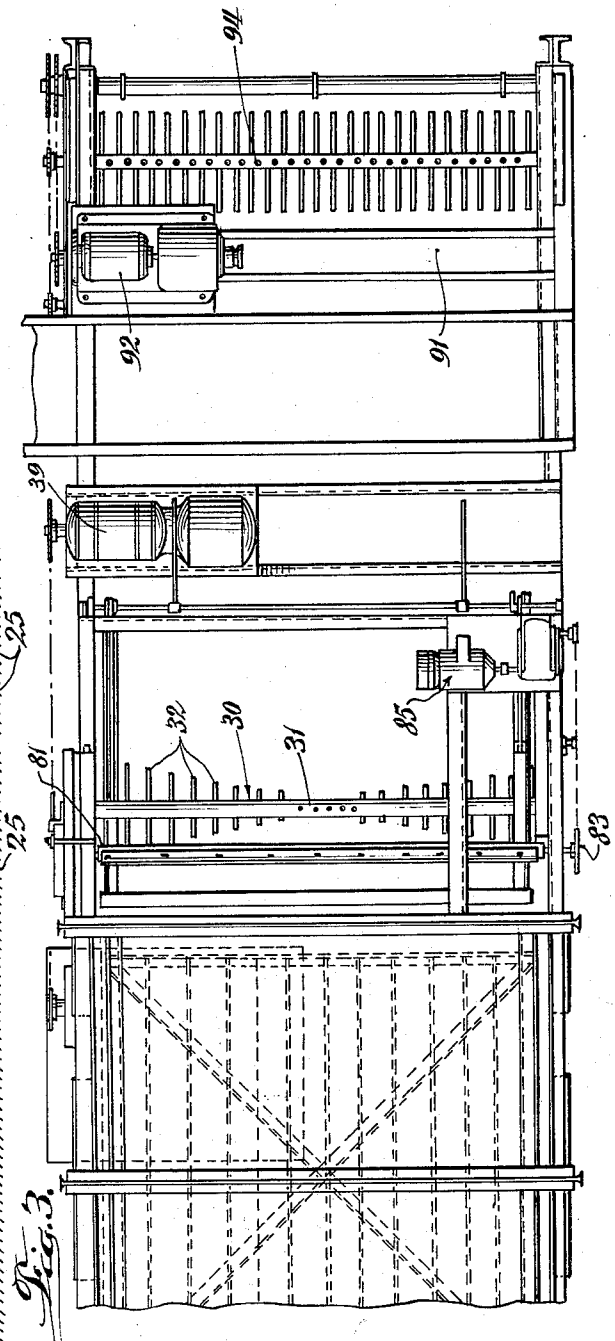

Fig. 3.

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APPARATUS FOR ADMIXING STRIP TOBACCOS

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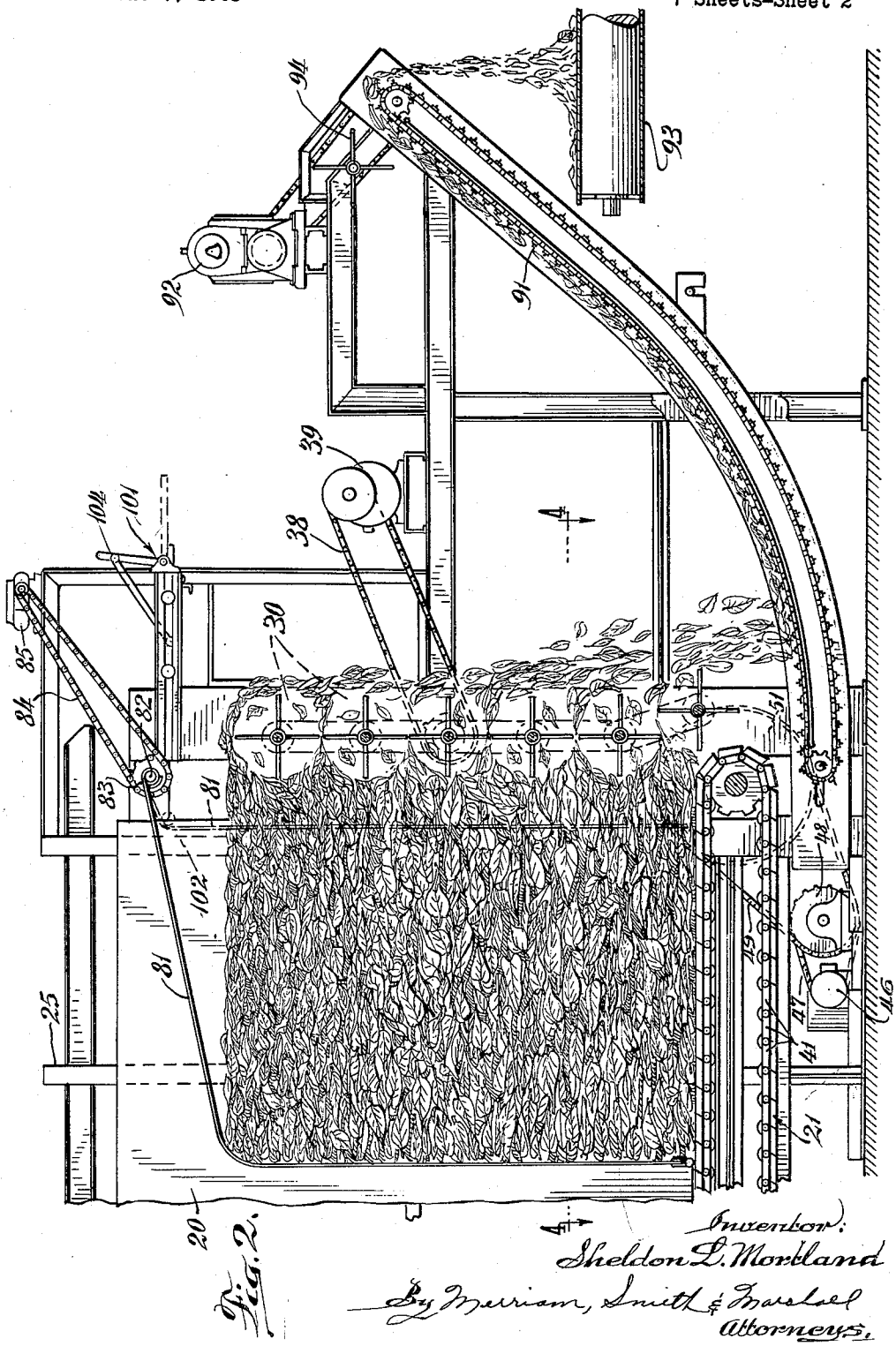

Fig. 2.

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APPARATUS FOR ADMIXING STRIP TOBACCOS

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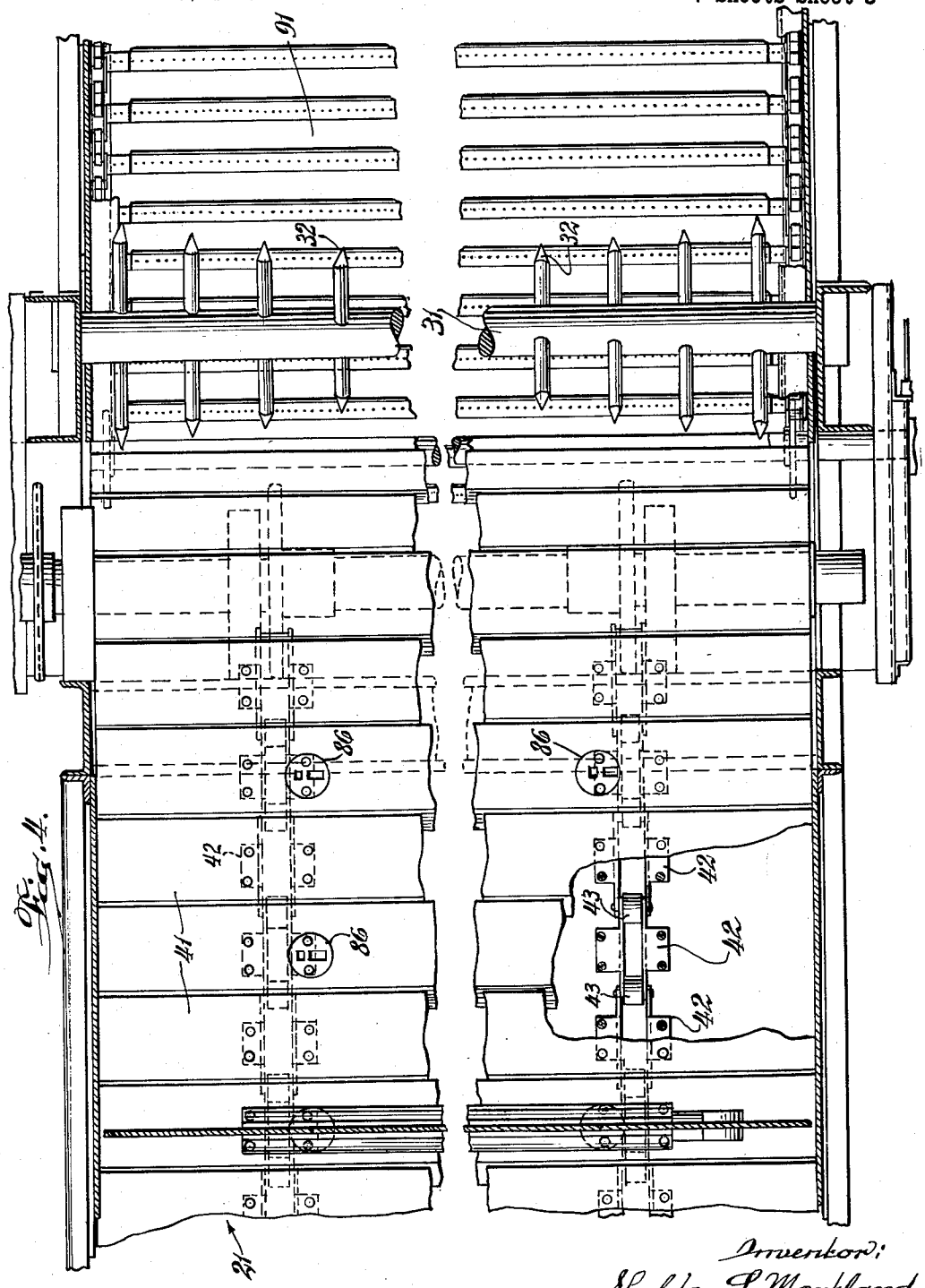

Fig. 4.

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APPARATUS FOR ADMIXING STRIP TOBACCOS

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Fig. 6.

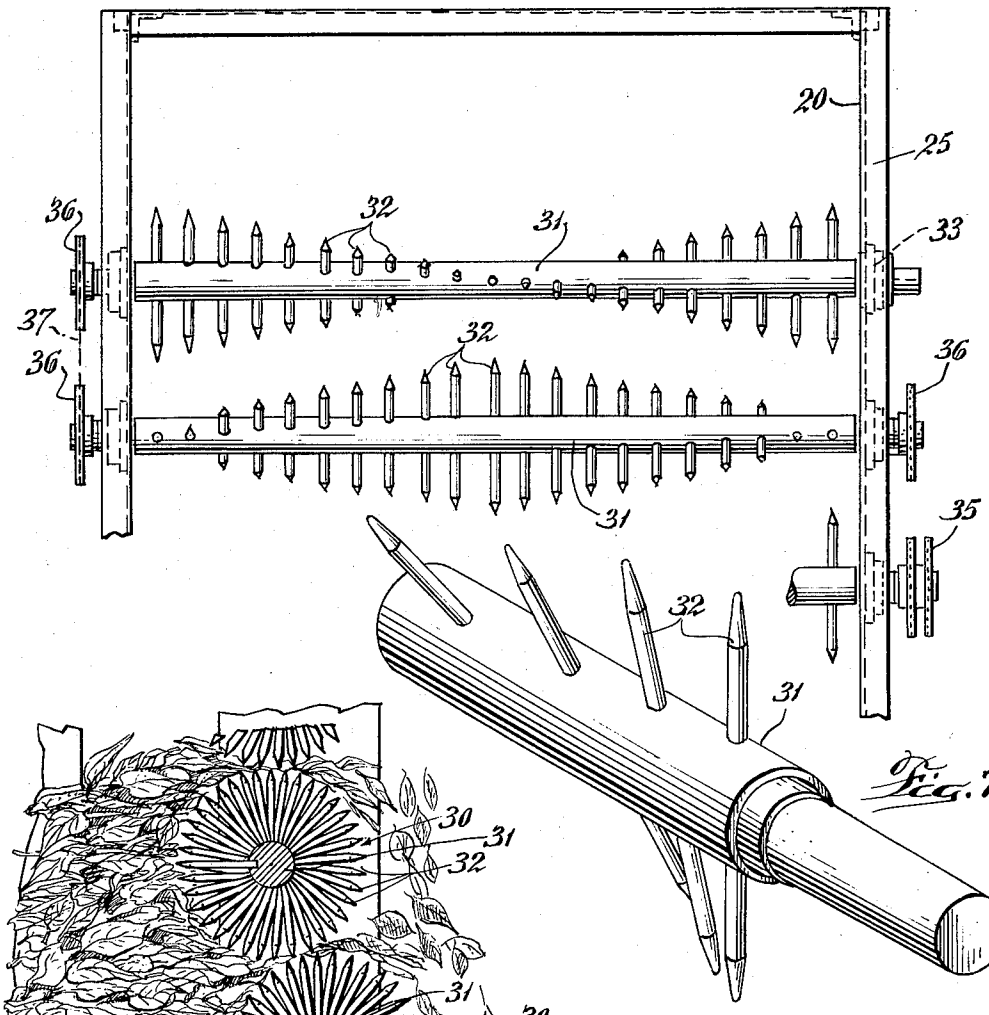

Fig. 7.

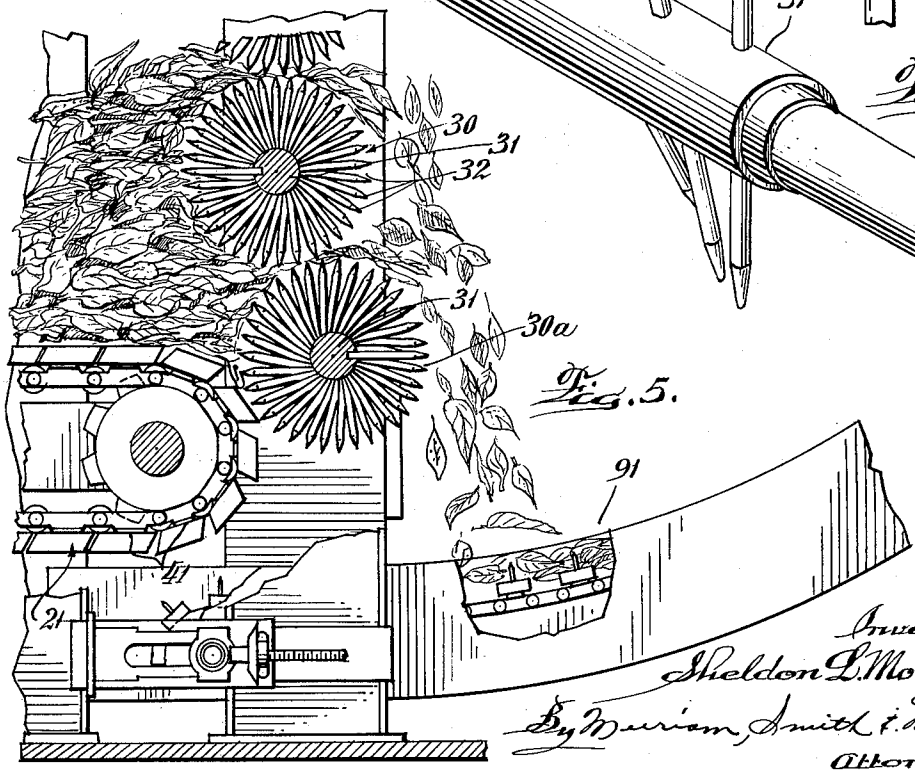

Fig. 5.

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APPARATUS FOR ADMIXING STRIP TOBACCOS

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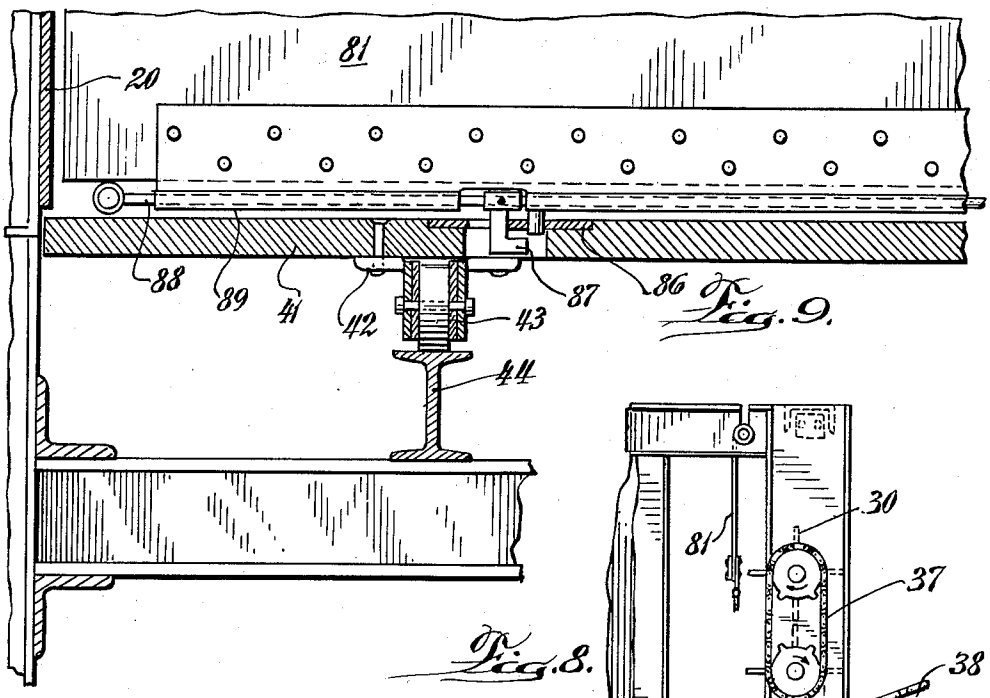


Fig. 9.

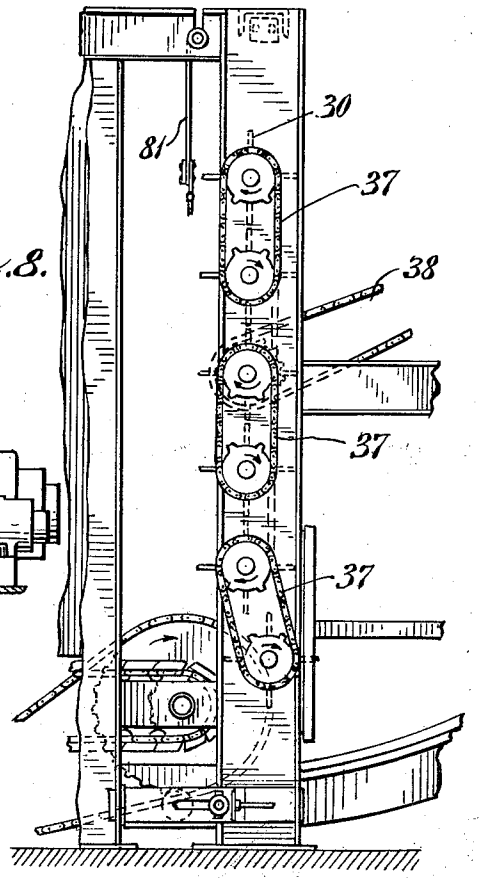
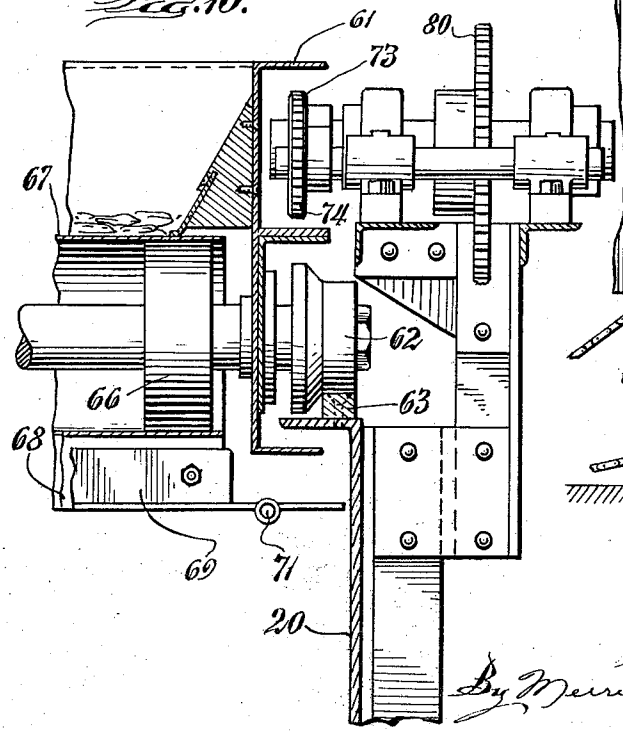


Fig. 8.

Fig. 10.



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APPARATUS FOR ADMIXING STRIP TOBACCOS

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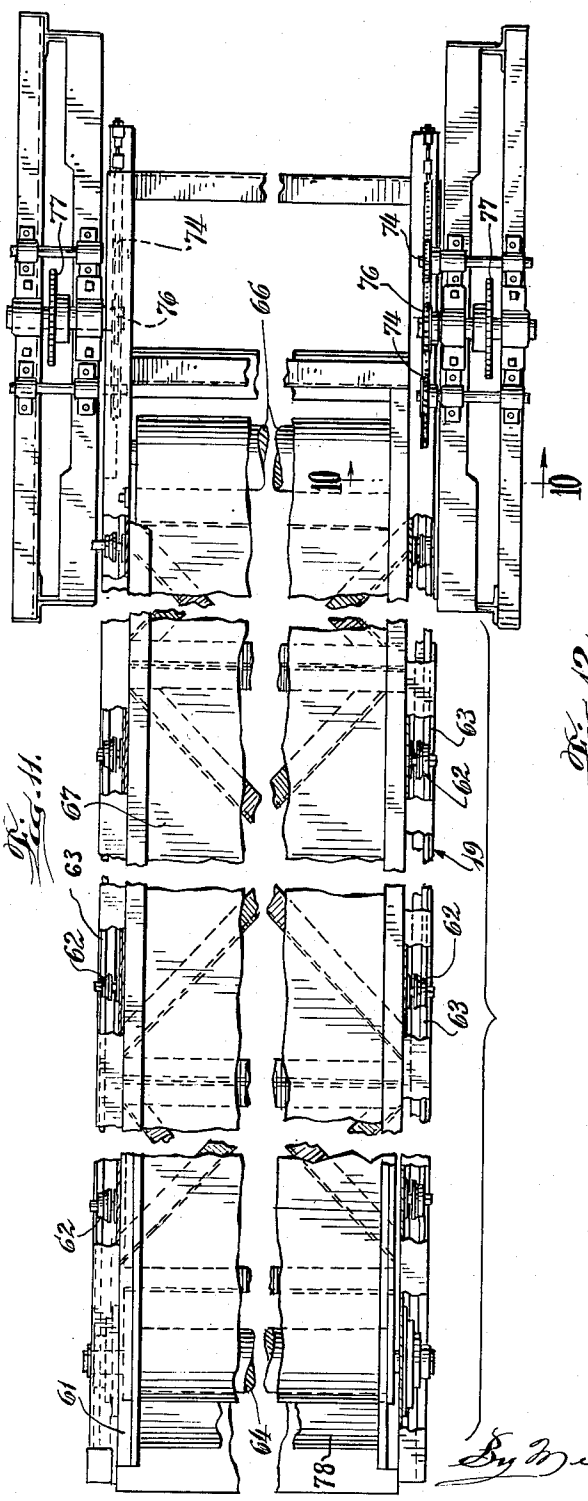

Fig. 11.

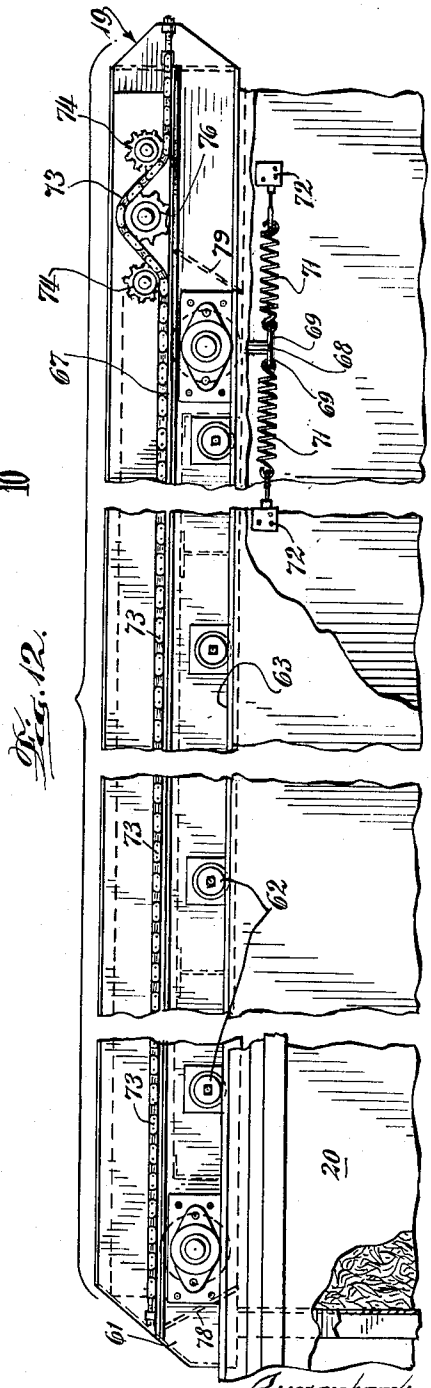

Fig. 12.

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APPARATUS FOR ADMIXING STRIP TOBACCOS

Filed June 1, 1961 7 Sheets-Sheet 7

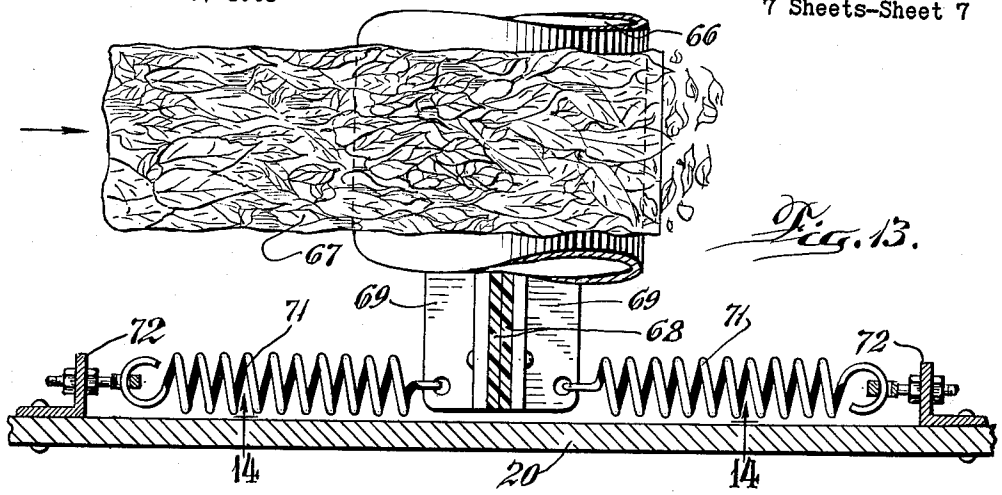

Fig. 13.

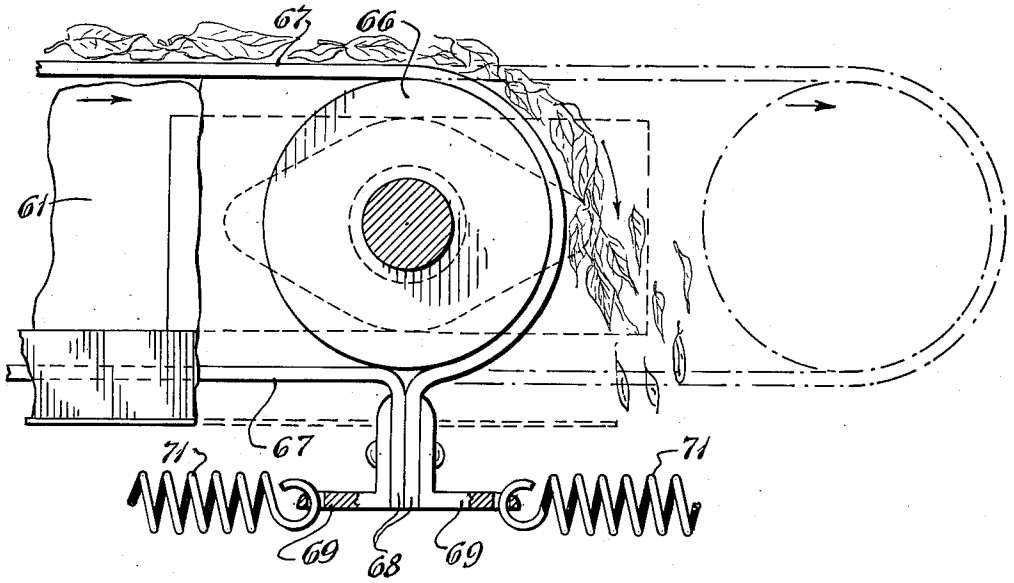

Fig. 14.

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United States Patent Office 3,125,231 Patented Mar. 17, 1964

3,125,231

APPARATUS FOR ADMIXING STRIP TOBACCOS

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Filed June 1, 1961, Ser. No. 114,196
3 Claims. (Cl. 214—17)

This invention relates to an apparatus for admixing strip tobaccos of different types and grades in large quantities and more particularly it relates to an apparatus which is useful for preparing the blends of the many types and grades of strip tobaccos typically used in the manufacture of cigarettes, while minimizing mechanical abrasion of the tobaccos and the production of fine particles.

In the manufacture of cigarettes it is the usual practice to use blends of different types and grades of tobacco to obtain an optimum combination of taste, aroma, burning properties, etc., in the final product. It is, in fact, not unusual to have as many as 30 to 50 different types or grades of tobacco in a cigarette blend. Once the composition of the blend has been established, the manufacturer is, of course, desirous of insuring that all of the component tobaccos used are intimately mixed so that every cigarette will ideally contain all of the component tobaccos with each in its proper proportion.

The several grades and types of tobacco used in preparing the final blend usually arrive at the manufacturing plant in the form of hogsheads of strip tobacco (i.e., tobacco leaves from which the central stem has been removed, leaving the tobacco in large, irregular pieces). Each of these tobaccos must be removed from the hogshead and admixed with the other tobaccos to produce a uniform blend before the blend is cut to produce the finely divided form used in cigarettes. In view of the productive capacity of modern cigarette-making plants, it is obvious that the batch size of blends of strip tobaccos must be substantial, for example, 40,000 pounds per batch, in order to minimize production expenses.

The difficulties involved in blending a non-granular material, such as strip tobacco, in lots containing many thousands of pounds to achieve a uniform blend while at the same time avoiding attrition of the tobacco leaves or the production of undesirable fines of tobacco are formidable ones. In the past, such large scale blending has not been used. Prior methods involved feeding tobacco by means of manual labor from each of the many hogsheads required in appropriate amounts into a relatively small blender operating continuously. These procedures, of course, entailed problems of maintaining constant flow rates for each of the many tobaccos used in the blend and resulted in undesirable variations in the final blend.

In accordance with the invention there is provided an apparatus suitable for blending any desired number of different grades or types of tobacco in commercial size lots on the order of 40,000 pounds or more without the production of objectionable tobacco fines. Briefly, the apparatus of the invention provides means for spreading consecutively each of the tobaccos to be used in a relatively thin, uniform, horizontal layer with one layer on top of another, producing thereby an elongated, multilayered mass of tobacco, and means for dislodging from the elongated mass relatively thin, vertical sections of tobacco progressively from one end of the mass while simultaneously mixing the tobaccos in these dislodged sections.

The apparatus of the invention will be better understood from the following detailed description thereof, taken in conjunction with the accompanying drawings,

in which the same numerals are used to indicate like elements in the several views and in which:

FIGURE 1 is a side view of the apparatus of the invention showing the general arrangement of the equipment including the means for feeding tobacco from hogsheads and the means for dislodging the tobacco from the elongated mass formed;

FIGURE 2 is an enlarged side view of the discharge end (i.e., right end) of the apparatus of FIGURE 1 showing the dislodging and discharging means of the invention;

FIGURE 3 is a plan view of the discharge end of the apparatus shown in FIGURE 2;

FIGURE 4 is a partial sectional view along the line 4—4 of FIGURE 2 showing the movable belt used to advance the tobacco mass into the discharge means (doffers);

FIGURE 5 is a partial enlarged side view of the lower discharge doffers;

FIGURE 6 is an elevational view of several of the discharge doffers showing the spiral positioning of the finger-like elements on the doffers;

FIGURE 7 is a perspective of a portion of one of the discharge doffers showing the positioning of finger-like projections thereon;

FIGURE 8 is a side view of the discharge doffers showing the drive means used to rotate the doffers;

FIGURE 9 is a detail of a portion of the discharge curtain used to prevent displacement of the mass of tobacco near the discharge end;

FIGURE 10 is a partial section along the line 10—10 of FIGURE 11, showing the means for supporting and driving the shuttle car used to feed the tobacco in horizontal layers;

FIGURE 11 is a fragmentary top view of the shuttle car;

FIGURE 12 is a side view of the shuttle car shown in FIGURE 11;

FIGURE 13 is a detail of the means for shock mounting the belt used in the shuttle car of FIGURES 11 and 12; and

FIGURE 14 is a sectional view along the line 14—14 of FIGURE 13.

Referring to the drawings, FIGURE 1 shows in general the apparatus of the invention. In this figure there is depicted at 10 a tobacco feeder comprising an elevator platform 11 on which there is positioned a hogshead of tobacco 12 with the wooden staves of the hogshead removed, the tobacco continuing to maintain the shape it had attained while in the hogshead. As the elevator is raised the tobacco is caused to bear against a number of rotating doffers 15 or any suitable equivalents thereof which cause the tobacco to be discharged onto moving inspection belt 13 which, in turn, discharges the loose tobacco onto loading elevator 14 comprising a moving belt equipped with short pins which hold the loose tobacco leaves while they are transported up the elevator. Kickback doffers 16 rotating in a clockwise direction control the passage of tobacco on elevator 14 at a uniform rate, any excess tobacco being dislodged in a direction toward the foot of the elevator. The tobacco discharges from the upper end of the elevator 14 onto a conveyor 17 which transfers it to a point in the middle of the bin or "main bulk" 18 in which the tobacco is accumulated. Main bulk 18 is a large, box-like structure with an open top and smooth sides 20, typically formed of plywood held in place by a suitable framework 25. The bottom surface consists almost entirely of an endless conveyor 21 which is stationary while the tobacco is beind loaded. In FIGURE 1, portions of the

sidewalls 20 and framework 25 of the bulk 18 have been broken away in order to show the interior arrangement. Discharging from the exit end of conveyor 17, the tobacco falls on a reciprocable shuttle car 19 which is mounted above the open main bulk 18 and which, in a manner to be described in more detail below, drops the tobacco onto conveyor 21 in uniform, horizontal layers throughout the length thereof.

The various types and grades of tobacco required for the blend are loaded into the main bulk 18 in horizontal layers, one on top of the other, each layer being essentially uniform in thickness through its extent, until there is produced an elongated mass of tobacco 22 comprising a plurality of horizontal layers of tobacco. The several layers of tobacco, however, are not all necessarily equal in thickness, since the relative proportions of each type of tobacco are not necessarily the same.

As an indication of the size of the apparatus, it will be understood that for a commercial bath of tobacco comprising approximately 40,000–50,000 pounds, a typical main bulk might be about 45–50 feet long and about 7–8 feet wide, with the tobacco being loaded therein to a depth of about 5–6 ft.

The discharge (right) end of bulk 18 is provided with a number of rotatable discharge doffers 30 arranged generally vertically, one above the other, as shown in FIGURES 2, 3, 4, 6, and 7. Each doffer consists of a rotatable shaft 31 provided at regular intervals along its length with a number of blunt projections or fingers 32 extending from diametrically opposed sides of shaft 31. Adjacent fingers are displaced circumferentially about the shaft 31 so that the ends of the fingers describe a spiral path about the shaft. In the embodiment shown in the figures, each doffer contains about 21 fingers each of which is angularly displaced from the preceding one. In this way the ends of the fingers traverse a path of 180° around the shaft. It will also be seen (FIGURE 6) that the fingers in adjacent doffers are arranged so that the projection of the clearance distance between corresponding fingers on adjacent doffers is essentially constant. Each of the doffer shafts 31 is held in a suitable bearing (e.g., 33) and the ends thereof are provided with sprockets, e.g. 36, which by means of suitable chains 37 (FIGURE 8) drive all the doffers in the same direction (clockwise in FIGURE 8). Power for operating the system of doffers is obtained through sprocket 35 and chain 38 from motor 39 (FIGURE 2). The spacing between the shafts of adjacent discharge doffers is such that the tips of the fingers would just meet were the adjacent doffers not rotationally displaced so as to provide clearance. In other words, when viewed from the side, as in FIGURE 5, the circles described by the ends of the fingers in adjacent doffers would be approximately tangent to each other.

It will also be seen in FIGURE 5 that the lowermost doffer 30*a* is somewhat laterally displaced so that it is not in a vertical line with the remaining doffers. This arrangement is desirable in order to permit lowering the shaft of doffer 30*a* to about the level of main bulk conveyor 21. Thus the lowermost layer of tobacco on conveyor 21, which has a tendency to droop as it leaves the end of the conveyor cannot by-pass the doffer 30*a* and thus avoid being mixed with the remaining tobacco.

The main bulk conveyor 21 comprises in the embodiment shown a series of transverse wooden slats 41 joined together by links 42 on the under surface (FIGURE 4) and equipped with wheels 43 which roll on tracks 44 (FIGURE 9) running the length of bulk 18. The main bulk conveyor is driven by motor 46 through the system of chains and sprockets 47, 48, 49, and 51 (FIGURE 2).

The shuttle car 19 used to deposite the loose tobacco in uniform, thin layers in main bulk 18 comprises (see FIGURES 10, 11 and 12) a frame 61 provided with wheels, e.g., 62, rolling on track 63 which is mounted along the sides of main bulk 18. Stretched around pulleys 64 and 66 at each end of the car is a belt 67 which has one

transverse section thereof fixed with respect to main bulk 18 on which the shuttle car rides. This fixed section comprises a flap 68 composed of the ends of the belt which are clamped between angles 69 which in turn are resiliently mounted to the wall 20 of the main bulk 18 by means of coil springs 71 and mounting plates 72 (FIGURE 13). Along the length of the shuttle car and on both sides thereof run flexible chain link belts 73 which pass under idler wheels 74 and are driven by sprockets 76 which in turn are driven by sprockets from any convenient power source (not shown). The position of sprockets 76 relative to the top of the main bulk 18 is fixed so that rotation of sprockets 76 on either side of shuttle car 19 causes movement of the entire car in a direction depending on the direction of rotation of the sprockets. It will be observed that, because belt 67 has a flap across its width which is also fixed relative to the main bulk, movement of the shuttle car aso causes belt 67 to pass around pulleys 64 and 66 in a direction dependent on the direction of travel of the shuttle car, as seen in FIGURE 14, which depicts movement of the shuttle car toward the right of the figure.

In the operation of the apparatus of the invention loading elevator 14 and conveyor 17 carry to the middle of main bulk 18 a supply of strip tobacco at a constant rate. Shuttle car 19, which has a length exactly one-half the length of the main bulk which it feeds, is positioned under conveyor 17, the discharge end of which is at the midpoint of the length of bulk 18. It will be seen that when the shuttle car 19 has reached the position shown in FIGURE 1 (i.e., at its extreme right end extension), belt 67 on the shuttle car has been loaded with tobacco discharging from conveyor 17. At this point the direction of travel of car 19 is reversed by reversing the rotation of sprockets 76, so that it begins to move at a uniform rate to the left. Because of the fixed position of flap 68 of belt 67, movement of the shuttle car to the left causes the belt 67 to travel downwardly over the left-hand pulley 64 of the shuttle car and to drop the tobacco loaded thereon at a uniform rate. When the extreme left-hand position of the car is reached, belt 67 has again been loaded with tobacco which wil be dropped on the right half of the bulk when the shuttle car reverses its direction. It will be seen, therefore, that passage of the shuttle car from its extreme right position to its extreme left position causes deposition of tobacco in the left half of the main bulk, while passage from left to right causes deposition of tobacco in the right half of the bulk. In order to avoid a depression in the midpoint of the bulk, shuttle car 19 is provided with inclined baffles 78 and 79 (FIGURE 12) which slightly deflect the tobacco discharged by belt 67 in a direction opposite to that in which the shuttle car is moving.

The springs 71 used to fix flap 68 prevent breakage of the belt when the end positions of the shuttle car are reached and also aid baffles 78 and 79 in tending to avoid the formation of a depression in the middle of the main bulk by yielding as the end positions of the car are reached and thereby avoiding a single definite end point.

The side walls and left-hand end of main bulk 18 are covered with a suitable sheet material, such as plywood, for containing the tobacco deposited therein. The right-hand wall of the main bulk is provided by an extendable curtain 81, suitably made of multiple belting material, which is rolled around a shaft 82, which is connected through sprocket 83 and drive chain 84 to motor 85 for creating tension in the curtain as desired (FIGURE 2). During the loading, the main bulk curtain 81 is extended to a position directly below shaft 82 and fastened to appropriately placed connecting points on the conveyor 21. Suitable attachment means are shown in FIGURE 9 comprising plates 86 set into suitable openings in slats 41 at intervals along the length of the main bulk conveyor 21. Plates 86 contain suitable openings into which there can be inserted clips 87 which are actuated by moving rod

88 which is held in tube 89 attached to the lower edge of the curtain 81.

Curtain 81 is tensioned by means of motor 85 and provides a temporary wall for supporting the mass of tobacco which is built up within the main bulk.

After the main bulk has been charged with the entire batch of tobacco in uniform, horizontal layers, as described above, curtain 81 is disengaged from its points of attachment to conveyor 21 and withdrawn, leaving the end face of the tobacco exposed. At this time conveyor 21 and doffers 30 are energized, thereby causing the exposed face of the tobacco to be fed into the doffers which rotate at speeds suitably in the range of 20–25 r.p.m. As the mass of tobacco is fed into the doffers the rotating fingers thereof dislodge vertical sections from the exposed face of the tobacco mass, kicking the individual tobacco leaves out and away from the face of the tobacco mass. The dislodged leaves then fall to a position at the foot of the doffers onto discharge conveyor 91 which obtains its power, as shown, from motor 92. The tobacco falling on conveyor 91 is carried by it to another conveyor 93 leading to the cutting machinery used for shredding the strip tobacco for use in cigarettes. Kickback doffer 94, also driven by motor 92, is used to maintain a constant discharge rate from conveyor 91 onto conveyor 93.

It will be seen that the uniform, vertical sections dislodged from the main mass of tobacco contain all of the tobaccos desired in the blend, each of which is present in its proper proportion. In passing through the doffers and falling to conveyor 91 the tobacco experiences further mixing which is also added to by the mixing action of kickback doffer 94 and conveyor 91 acting on the pile of tobacco which accumulates at the bottom of the conveyor. The tobacco picked up and discharged by conveyor 91 consequently constitutes the desired blend in the right proportions, which blend has been achieved with a minimum production of undesirable fines and shreds.

As the mass of tobacco is fed by means of conveyor 21 into discharge doffers 30, it will be seen that the opposite end of the mass of tobacco will move away from the end wall of main bulk 18 and thus be unsupported. This is of little consequence during most of the travel of the mass of tobacco since the weight of the tobacco itself tends to maintain the multi-layered arrangement of the mass without disturbance. When, however, the mass of tobacco has been reduced to a length on the order of 10 or 12 ft. (assuming a mass about 5–6 ft. high), a point is reached where the height is a relatively large proportion of the remaining length so that the multilayered arrangement of the tobacco mass is apt to be disturbed by the force applied by the doffers against the advancing face of the tobacco mass. It has, therefore, been found advisable at this point to provide some support for preventing the collapse of the trailing face of the tobacco mass as it approaches closer and closer to the rotating doffers. This is conveniently accomplished by means of the same extendable curtain 81 which was used originally to support the forward face of the tobacco mass. The curtain is extended to the position shown in FIGURE 2, passing beyond the trailing face of the tobacco mass and is attached as previously described to the main conveyor belt 21. Motor 85 is then used to tension curtain 81 thereby supporting the trailing face of the tobacco mass against collapse as it is fed into the doffers.

It will be seen from the arrangement of the equipment in FIGURE 2 that the tensioning of curtain 81 would have a tendency to force the upper portion of the tobacco mass into the doffers at a relatively high rate as the curtain tends to straighten out under the tensioning force of motor 85. Because of the weight of the tobacco, however, and the relatively small amount of tensioning force required to support the trailing face of the tobacco mass, this tendency does not result in any serious problem until the advancing curtain is almost adjacent the rotating doffers. In order to minimize the uneven feeding of tobacco into the doffers when this point is reached, there is provided a curtain bar assembly indicated generally at 101 (FIGURE 2). This assembly comprises a transverse bar 102 which is supported in a suitable framework and is extendable a short horizontal distance (for example, about 20 inches) by operation of the handle 104 from its horizontal position, indicated by broken lines, to the vertical position. While the main bulk 18 is being loaded with tobacco the handle 104 is in the horizontal position in which the transverse bar is retracted to the right a sufficient distance to permit the curtain to be attached to conveyor 21 at a point directly beneath shaft 82. As the end of the operation is approached, however, and curtain 81 is extended to support the trailing face of the advancing tobacco mass, handle 104 is raised to its vertical position, thus extending transverse rod 102 to a point to the left of its former position. As the tobacco advances into the rotating doffers, curtain 81 will eventually strike transverse rod 102 and thus be restrained from toppling the thin remaining mass of tobacco over into the doffers and thus upsetting the normal functioning of the apparatus.

It is, of course, possible to operate the apparatus of the invention in single units. Since, however, there will obviously be a break in the production schedule while the main bulk is being reloaded with tobacco in preparation for the succeeding run, it will be more convenient to use the apparatus in pairs, loading one while the other is feeding tobacco to the manufacturing process.

It is also possible to use two or more individual units of the apparatus of the invention feeding simultaneously. In such cases it will generally be found desirable to synchronize the drive motors used to advance the main bulk conveyor and actuate the other operating parts of the equipment by methods which are known to those skilled in the art.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

What is claimed is:

1. Apparatus for uniformly admixing a plurality of strip tobaccos of different types and grades comprising bin means for receiving and holding an elongated mass of loose tobacco, movable conveyor means in said bin means for supporting and conveying said mass to one end of said bin, dislodging means at said one end of said bin arranged in a plane transverse the movement of said conveyor means and substantially vertical thereto for dislodging relatively thin vertical sections from said mass, a pliable curtain having one portion covering a substantially entire cross section of said bin means arranged in a plane substantially parallel to said first described plane and spaced therefrom said curtain having tensioning means extending over said mass in covering relationship thereto from said one portion substantially to said first plane, and removable coupling means coupling one end of said curtain to said conveyor means whereby said curtain moves with said conveyor means to maintain said mass of tobacco therealong.

2. A device substantially as set forth in claim 1 and further characterized by said tensioning means engaging the end of said curtain opposite said first described one end and having means to maintain a predetermined tension on said curtain.

3. Apparatus for conveying, mixing and delivering strip tobaccos cross sectionally from a bulk mass of loose strip tobaccos comprising a conveyor for supporting said mass and feeding it in one direction, plural feed means positioned in a substantially vertical plane transverse the direction of feed of said mass by said conveyor to dislodge portions of said mass along said vertical plane and a pliable curtain secured at its one end to said conveyor and being anchored at its other end distant from said conveyor and extending over said mass in covering relationship thereto to position said curtain in a plane sub-

stantially parallel said first described plane and spaced therefrom whereby said curtain may serve to back said mass as it is moved by said conveyor to said plural feed means.

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