Jan. 16, 1962 O. PETERS 3,016,906

DEVICE FOR LOOSENING AND DISTRIBUTING OF TOBACCO OR THE LIKE MATERIAL

Filed Nov. 12, 1957 3 Sheets-Sheet 1

Fig. 1

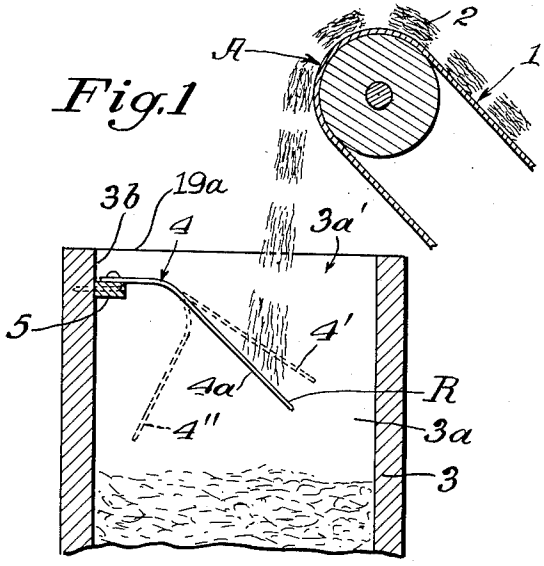


Fig. 3

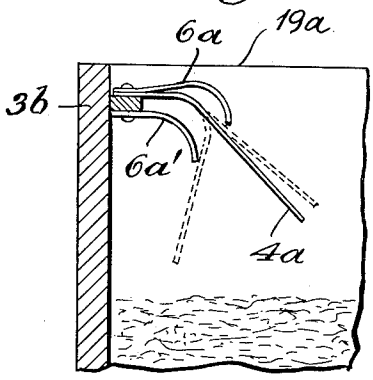


Fig. 2

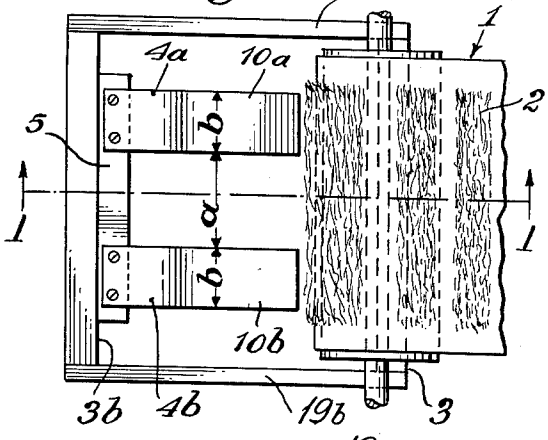
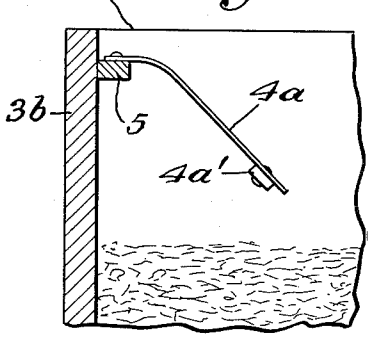


Fig. 4



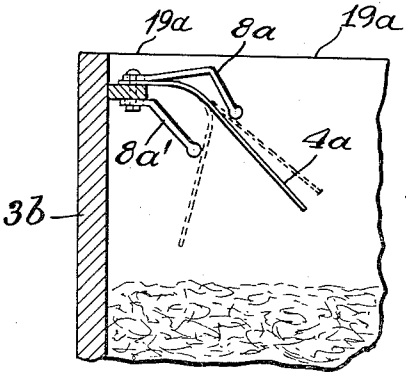


Fig. 5

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Fig. 7

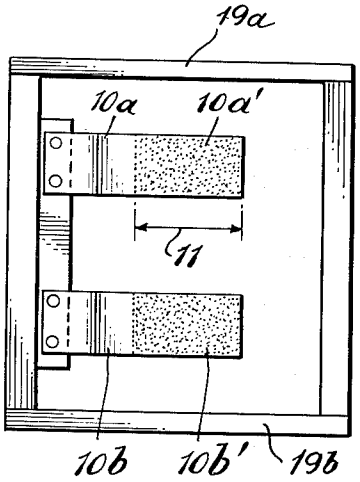


Fig. 6

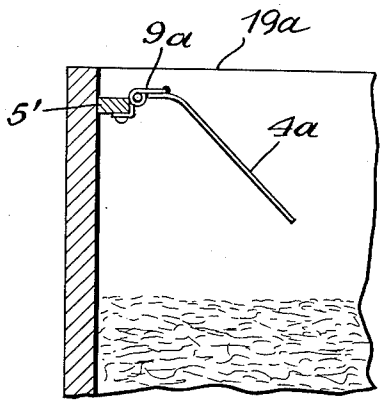


Fig. 8

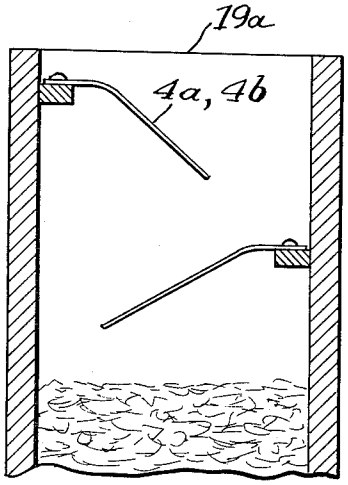
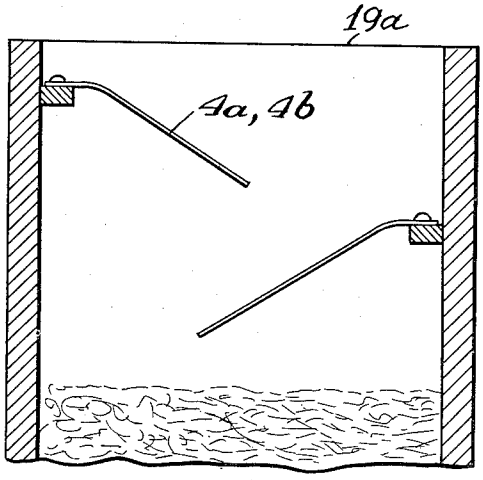


Fig. 9



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Fig. 11

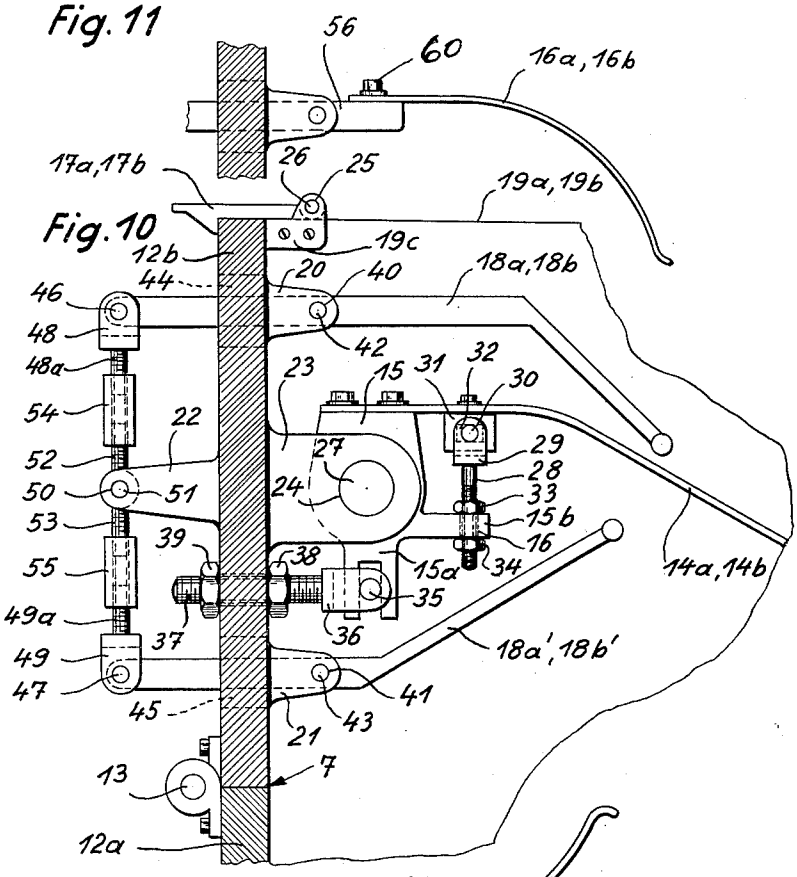
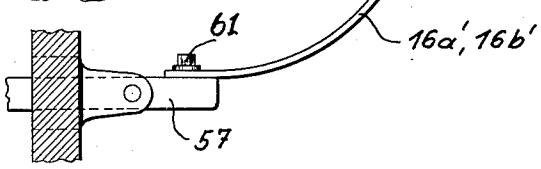


Fig. 10

Fig. 12



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3,016,906

DEVICE FOR LOOSENING AND DISTRIBUTING OF TOBACCO OR THE LIKE MATERIAL

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Claims priority, application Germany Nov. 15, 1956
7 Claims. (Cl. 131—108)

The invention relates to improvements in a device for loosening and distributing of tobacco or the like material.

In order to feed tobacco uniformly from a tobacco supply chamber to tobacco treating machines and tobacco manufacturing machines, it is necessary to make provision for a thorough loosening and a uniform depositing of the tobacco in layers in said supply chamber. It has been proposed heretofore to employ for this purpose a chamber having arranged therein a row of elements which engage the tobacco which is dropped into the chamber. Such elements consist, for instance, of oscillating or rotating rakes or also of reciprocating scratchers. Furthermore, it has also been proposed heretofore to provide outside of the supply chamber, oscillating or reciprocating or other movable feeding elements which act upon the tobacco when it is conducted into said supply chamber. All these elements require in their operation a drive mechanism.

It is an object of the present invention to employ for the loosening and distributing of the tobacco a device which does not require any drive mechanism which has to be operated by an exterior prime mover.

Another object of the invention is to provide a supply chamber for the tobacco with a plurality of distributor elements which are yieldably arranged in such a manner that they perform an oscillating movement when tobacco drops upon the same. In accordance with the present invention the distributor elements are maintained in their rest position by their own or by their foreign produced initial tension from which position they are moved under the action of the tobacco dropping upon the same. When this happens, the initial tension in said distributor elements is increased about a suitable amount and this additional tension is employed for performing the work which consists in loosening and distributing the tobacco which has been dropped into the supply chamber. After the tobacco has actuated the distributor elements and in turn has been influenced by the same the distributor elements return to their initial or rest position.

In this manner an automatic loosening and distributing of the tobacco takes place, but this automatic operation of the distributor elements requires that the characteristic of the material dropping upon the same and also the characteristic of the feeding device has to be properly considered in the selection and arrangement of the distributor elements within the chamber.

As a result of numerous experiments. it was determined that different arrangements of distributing elements may be used which not only take in consideration the prevailing condition of the material dropped upon the same, but also take into consideration the form of the feeding device which conveys the material into the supply chamber.

The material may be in different conditions or forms; it may be leaf-like, fiber-like or also be in heaps, layers or lumps. Concerning the form of feeding the material there is to be considered whether the feeding device is belt-like with or without interruptions or takes place in a wide path or in a narrow path, whereby also in each case the cross-section of the material fed toward or into the chamber plays a certain part. Depending upon in which condition the material is or in what manner it is

fed, the elements for loosening and distributing the material within the chamber have to be constructed accordingly. The elements, according to the prevailing cross-section of the chamber, may be made adjustable or may also by means of a suitable regulator be made adaptable to a different type of material.

For facilitating a proper selection of the elements for different operating conditions it is of advantage to employ yieldable deflecting surfaces which are subdivided so that spaces are formed between the same through which portions of the material drop directly downwardly. The yieldable deflecting surface may consist of leaf-springs which are secured with one of their ends to a holder and in which the initial tension of the leaf-springs is formed by the own weight of the leaves. The initial tension may also be increased in other manner, for instance by the additional arrangement of weights. In certain cases, as shown by the experiments, it was found advisable to hold in readiness a greater range for the oscillation of the deflecting leaves, and furthermore the deflecting leaves could be made rigid or yieldable and also could be attached yieldably to a holder.

The adjustment and regulation of the action of the deflecting leaves may be varied if necessary even during the operation, namely, by changing the initial tension in a simple manner. Even the oscillation characteristic of these deflecting leaves may be changed, for instance, by weights attached to the latter. Other means for regulating the action of the deflecting leaves consists, for instance, in the provision of rigid or yieldable adjustable abutments which limit the range of oscillation of the deflecting leaves. In order to meet the various operating conditions, even when the deflecting leaves are mounted later into the chamber, it is advisable that the holder for the deflecting leaves permits a change of the rest position of these leaves within the range of the upper inlet opening of the chamber.

Since the devices of the present invention, almost without exception, operate continuously it is advisable to construct the device as simple as possible in order to keep the parts clean and the adjustment of the device simple so that the deflecting leaves may be replaced quickly and without much difficulty. This can be done in this manner, that the holder permits an easy pivotal movement of the deflecting leaves outside the range of the inlet opening of the chamber which can be obtained in that the holder is made easily detachable from the chamber.

Experience in the construction of tobacco treating and tobacco manufacturing machines has indicated that in many cases it is advisable to employ a plurality of similar deflecting leaves which selectively may be replaced by other deflecting leaves performing a different action. Since the experiments did not only consider different operating conditions, such as different forms of material and different shapes of feeding devices, but also different tobacco types it was discovered that the condition of the surfaces of the deflecting faces, upon which the material drops, influences considerably the total effect upon the material. For different types of application it has been found of advantage to provide the leaves or the parts of the deflecting leaves which face the material dropping into the chamber with a coarse surface. On the other hand, however, the deflecting leaves may, for instance, be coated with a correspondingly acting material to influence the bouncing or the sliding movement of the material from or along the deflecting leaves.

These and other objects of invention will now be described in more detail with reference to various embodiments of the device of the invention in the following description with reference to the accompanying drawings in which:

FIG. 1 illustrates diagrammatically a sectional view of

a supply chamber substantially along the line 1—1 of FIG. 2 and shows a yieldable deflecting leaf near the upper end of the chamber;

FIG. 2 shows diagrammatically a plan view of the device illustrated in FIG. 1;

FIG. 3 shows a portion of a vertical sectional view of a chamber provided with yieldable deflecting leaves and yieldable abutments;

FIG. 4 shows a portion of a vertical view of a chamber with a yieldable deflecting leaf provided near its outer end with a weight;

FIG. 5 shows a portion of a vertical sectional view of a chamber in which stationary abutments are provided for the yieldable deflecting leaf.

FIG. 6 shows a portion of a vertical sectional view of a chamber in which the deflecting leaf is yieldably attached to a holder;

FIG. 7 shows a plan view of a chamber with deflecting leaves having a coarse upper surface;

FIG. 8 shows a vertical sectional view of another chamber containing deflecting leaves arranged on opposite walls;

FIG. 9 shows another vertical sectional view of still another chamber provided with deflecting leaves arranged on opposite walls;

FIG. 10 shows the construction and arrangement of an adjustable deflecting leaf adapted to be tilted to an inoperative position outside the chamber;

FIG. 11 shows the adjustable arrangement of an upper yieldable abutment leaf; and

FIG. 12 shows the adjustable arrangement of a lower yieldable abutment leaf.

Referring to FIG. 1, the feeding device **1** in the form of an upwardly inclined endless conveyor discharges the material **2** consisting, for instance, of tobacco into the open upper end of a chamber **3**. Within the inlet openings *3a* of the chamber **3** is arranged a deflecting member in the form of a leaf spring **4**, the rest position of which is indidcated in full lines R. The leaf spring **4** is attached with one of its ends to a holding member **5** which is attached to the inner wall *3b* of the chamber **3**, preferably in detachable manner. The wall *3b* is arranged opposite the feeding device **1**.

Certain portions of the material **2** dropping from the conveyor **1** into the chamber **3** engage, for instance, as shown in FIG. 2, two leaf springs *4a* and *4b* which form a yieldable deflectiing surface which is caused to perform oscillations within the range indicated by the end positions of the leaves *4'* and *4''* shown in FIG. 1 in hatched dotted lines.

In order to modify the self-oscillation property of the leaves *4a* and *4b* there is illustrated in the modification of FIG. 3 the arrangement of an additional yieldable leaf *6a* above the leaf *4a* and another additional leaf *6a'* below the leaf *4a*. Furthermore, additional means may be employed which modify the action of the additional leaves *6a* and *6a'*, and also the time during which they are engaged by the leaf *4a*. The leaf *4b*, of course, cooperates with similarly arranged additional leaves.

Another possibility to influence the action of the leaf springs *4a* and *4b* consists in this, that the oscillating characteristic of the same is changed by changing the specific weight of the leaves *4a* and *4b*. This may be done, for example, by attaching weights *4a'* as shown in FIG. 4 to each of the leaves *4a* and *4b*; it may even be advisable to make these weights *4a'* adjustable in various directions for obtaining the desired action of the leaf springs *4a* and *4b*. The leaf springs *4a* and *4b* can be provided with a series of apertures to receive fastener elements passing through the weights.

If, for instance, it should be desired for a particular mode of application to employ only one of the mentioned leaves *4a* and *4b* as a deflecting surface then the oscillation range may be restricted also by employing abutments *8a* and *8a'*, as shown in FIG. *5*.

FIG. 6 shows an embodiment in which the leaf springs *4a* and *4b* are attached to a holding member *5'*, by springs *9a* which are employed for yieldingly supporting the springs *4a* and *4b* for obtaining a greater range of oscillation.

Another means of additionally influencing the action of the leaf springs consists in a change of the surfaces *10a* and *10b* upon which drop portions of the material **2**. FIG. 7 shows that the upwardly facing surface areas *10a'* and *10b'* along a distance **11** are made rough or coarse.

The FIGS. 8 and 9 illustrate the arrangement of two oppositely disposed and superimposed deflecting surfaces in the form of leaf springs, the action of which will be described or will be clear from a detailed description of the action of the device illustrated in the FIGS. 1 and 2. In the FIGS. 8 and 9 the deflecting surfaces are suitably arranged in such a manner within the chamber that the leaf springs forming two separate deflecting surfaces are arranged offset with respect to each other, or one above the other, but secured to opposite walls.

The material **2** is dropped from the feeding device **1** at A and falls freely into the upper opening *3a'* of the chamber **3**. The leaf spring forming the deflecting surface **4** project into the opening *3a*. The leaf springs *4a* and *4b* according to FIG. 2 have each a width *b* and are arranged parallel and spaced a distance *a* from each other. Therefore, certain portions of the material engage a portion of the leaves *4a* and *4b*, namely, the surface portions *10a* and *10b* which are directed upwardly. Already, during the free fall of the material a certain amount of loosening of the same takes place. Those portions of the material which engage the leaf springs *4a* and *4b* which are fed practically uniformly and during small time intervals into the chambers and which vary in size and amounts, as experiments have shown, will move the leaf springs *4a* and *4b* away from their rest position R and cause an oscillation of the same. Furthermore, there are always portions of the material which hit the surface of the springs which move in opposite directions of the free-fall of the material, and therefore these portions are treated, so to speak, in a triple manner. They are loosened and are caused to assist in loosening other portions which follow them in their fall into the chamber. Owing to this forced movement, however, these portions reach the bottom of the chamber uniformly distributed over the entire area of the bottom. In other words, also those portions of the bottom receive material which are below the leaf springs and cover an area having the width *b* (FIG. 2). Those portions of the material which do not engage the surface portions of the leaf springs *4a* and *4b* fall directly through the chamber between these leaf springs while certain portions of the material are laterally deflected by leaf springs *4a* and *4b* and will be influenced during their falling movement by still other portions which already have been deflected. Other portions of the material which follow preceding portions are being loosened and are in part deflected laterally into paths in order to be loosened still more. After this treatment, the various portions of the material drop uniformly distributed upon a surface which consists substantially of that portion of the bottom of the chamber which was previously not covered.

Since the principal portions of the material are treated directly by the leaf springs, while the remaining portions are treated indirectly, it follows that the total amount of the material during its passage through the chamber from the upper open end to the bottom of the same is treated in such a manner that the total result will be a loosening and a uniform distribution, and there is always obtained in the chamber a uniform and finely loosened supply of material over the entire height of the material and over the entire cross-sectional area of the chamber.

Referring to FIG. 10, the wall of the chamber is di-

vided at 7 in two sections 12*a* and 12*b*. The wall section 12*a* is fixedly connected with the side walls 19*a* and 19*b* as shown in the FIGS. 2 and 7. The other or upper wall section 12*b* is connected to the lower wall section 12*a* by means of a hinge 13 in such a manner that the wall section 12*b* is swingable outwardly, so that the entire deflecting device mounted on said wall section 12*b* can be moved outside the chamber. In the operative position of the wall section 12*b*, as illustrated in FIG. 10, the wall section 12*b* is held in position by the hooks 17*a* and 17*b*. The side walls 19*a* and 19*b* are provided at their upper edges with brackets 19*c* which have the hooks 17*a* and 17*b* attached thereto by means of pivot pins 26 mounted in bearings 25 provided on said brackets 19*c*. The wall section 12*b* has attached on its inner face a number of bearing blocks 20, 21, 22 and 23. The bearing block 23 has a bearing 24 supporting a rotary shaft 27 carrying the deflector support 15. The support 15 has two projections 15*a* and 15*b*. The projection 15*b* is provided with a bore 16 in which a threaded bolt 28 is secured. One end of the bolt 28 has a fork 29 formed thereon which is traversed by a pivot pin 30. The leaf spring 14*a* or 14*b*, respectively, has a guide block 31 attached thereto provided with a slot 32 through which said pivot pin 30 extends. By adjusting the clamping nuts 33 and 34 on the threaded bolt 28 the tension of the leaf springs 14*a* and 14*b* may be changed. The projection 15*a* is forked. The adjustment of the position of the deflector support 15 takes place in similar manner as the leaf springs 14*a* and 14*b* are adjusted, namely, by means of a threaded bolt 37, its fork 36 and pivot pin 35 and nuts 38, 39.

The rigid abutments 18*a*, 18*b*, 18*a'* and 18*b'* are rotatably adjustably supported about pivot pins 42, 43 arranged in the bearings 40 and 41, which latter are provided on the bearing blocks 20 and 21.

The outwardly extending ends of the abutments 18*a*, 18*b*, 18*a'* and 18*b'* extend through apertures 44 and 45 in the wall section 12*b* and are connected with each other by turnbuckles consisting of pivot pins 46, 47, threaded bolts 48*a* and 49*a* provided with forked ends 48 and 49; threaded sleeves 54 and 55, threaded bolts 52 and 53 and a pivot pin 51 in the bearing 50 about which the inner ends of the threaded bolts 52 and 53 are rotatable. The bearing 50 is arranged on the bearing block 22 attached to the outer face of the wall section 12*b*. The bolts 48*a* and 49*a* have the same thread, for instance, a left-handed thread and the bolts 52 and 53 are then provided with a right-handed thread. Of course, the sleeves 54 and 55 are threaded to accommodate the respective bolts.

The FIGS. 11 and 12 illustrate the details of the adjustability of the resilient abutments 16*a*, 16*b*, 16*a'* and 16*b'*. The pivot arms 56 and 57 are similar to the rear ends of the rigid abutments 18*a*, 18*b*, 18*a'* and 18*b'*. The resilient abutments 16*a*, 16*b*, 16*a'* and 16*b'* are attached to the arms 56 and 57 by a screw 60 and 61, respectively. The adjustment of the resilient abutments is effected in the same manner as the rigid abutments.

FIGS. 10 to 12 show the desired possibilities for adjustment of the springs, spring holders, rigid abutments, and yieldable abutments.

I claim:

1. In a device for loosening and distributing tobacco and the like material, means forming a chamber which is open at its upper end and formed by approximately vertical walls, gravity feed means spaced above said chamber for introducing the material to be loosened and distributed into the open upper end of said chamber, and substantially flat yieldable leaf spring members arranged in spaced relation within said chamber, said leaf spring members being rigidly secured to one of the vertical walls and with their outer ends being free and projecting obliquely downward and extending into the path of the material during its free gravity fall, the leaf spring members having such a yieldability that they perform an oscillating movement solely by the impact of the falling material when engaged by the material introduced into the upper end of said chamber, the major portion of the length of each of said leaf spring members including its free end lying in a single plane in said oblique direction when at rest, said leaf spring members extending beyond the central portion of said chamber with their free ends terminating in spaced relation from the wall of said chamber opposed to said one vertical wall.

2. In a device for loosening and distributing tobacco and the like material, means forming a chamber open at its upper end, said chamber having an approximately vertical wall, gravity feed means spaced above said chamber for introducing the material to be loosened and distributed under free gravity fall into the upper open end of said chamber, substantially flat yieldable leaf springs arranged in spaced relation within said chamber and rigidly secured to said vertical wall with their inner ends connected to said wall by straight portions and their outer ends projecting obliquely downward and into the path of material during its free gravity fall, said yieldable leaf springs having a yieldability such that they perform an oscillating movement solely by the impact of the falling material when engaged by the gravity fed material dropping into the upper end of said chamber, said yieldable leaf springs being arranged in spaced parallel relation and forming a sub-divided deflecting surface, the major portion of the length of each of said leaf springs including its free end lying in a single plane in said oblique direction when at rest, said leaf springs extending beyond the central portion of said chamber with their ends free and terminating in spaced relation from the wall of said chamber opposed to said one vertical wall.

3. A device as claimed in claim 2, including stationary abutment members for limiting the oscillation range of said leaf springs, and said abutment members being placed both above and below said leaf springs, whereby the oscillation range of the leaf springs can be controlled to meet varied operating conditions.

4. In a device for loosening and distributing tobacco and the like material, means forming a chamber which is open at its upper end, means for introducing the material to be loosened and distributed into the upper end of said chamber, and yieldable means within said chamber, said yieldable means having such a yieldability that they perform an oscillating movement when engaged by the material introduced into the upper end of said chamber, said yieldable means being formed of a number of leaf springs arranged in parallel and spaced relation and forming as a whole a subdivided deflecting surface, means attaching one end of said leaf springs to a stationary member within said chamber, and including yieldable abutment members for limiting the oscillation range of said leaf springs, and said abutment members being placed both above and below said leaf springs, whereby the oscillation range of the leaf springs can be controlled to meet varied operating conditions.

5. In a device for loosening and distributing tobacco and the like material, means forming a chamber which is open at its upper end, means for introducing the material to be loosened and distributed into the upper end of said chamber, and yieldable means within said chamber, said yieldable means having such a yieldability that they perform an oscillating movement when engaged by the material introduced into the upper end of said chamber, said yieldable means being formed of a number of leaf springs arranged in parallel and spaced relation and forming as a whole a subdivided deflecting surface, means attaching one end of said leaf springs to a stationary member within said chamber, and including yieldable and adjustable abutment members for limiting the oscillation range of said leaf springs, and said abutment members being placed both above and below said leaf spring members, whereby the range of oscillation of the leaf

spring members can be controlled to meet varied operating conditions.

6. In a device for loosening and distributing tobacco and the like material, means forming a chamber having opposed approximately vertical wall surfaces and which is open at its upper end, gravity feed means spaced above said chamber for dropping the material to be loosened and distributed into the upper end of said chamber, bracket members rigidly secured to said opposite wall surfaces and yieldable means within said chamber supported by the brackets on said opposite wall surfaces, said yieldable means having such a yieldability that they perform a to and fro vibratory movement when engaged by the material fed by gravity and dropped into the upper end of said chamber, said yieldable means comprising a plurality of series of parallel and spaced leaf springs, one end of one series of leaf springs being rigidly attached to the bracket on one wall of said chamber, while the end of the other series of springs is attached to the bracket on the opposite wall of said chamber, but offset in height with respect to the point of attachment of said first mentioned series of leaf springs said leaf springs being bent to extend obliquely downward in said chamber from the opposite walls of said chamber and with the major portion of the length of each of said leaf springs including its free end lying in a single plane and in said oblique direction when at rest.

7. In a device for loosening and distributing tobacco and the like material, a, chamber open at its upper end and provided with vertical walls, means for feeding tobacco to the upper end of said chamber so that it will fall by gravity into the open upper end of said chamber and spring means attached to said vertical walls and projecting into the path of the material and tobacco falling into said chamber by gravity, said spring means having a resiliency and self-oscillation property such that they perform an oscillating movement when engaged by the material falling through said chamber in a substantially vertical direction said spring means consisting of at least one substantially flat spring leaf having one end rigidly attached to one of said vertical walls adjacent the upper end of said chamber and extending outwardly and downwardly beyond the central portion of said chamber with its free end free and terminating in spaced relation to an opposed vertical wall of said chamber, the major portion of the length of each of said leaf springs including its free end lying in a single plane extending outwardly and downwardly beyond the central portion of said chamber when at rest, whereby said leaf spring will be vibrated solely by the impact of material falling thereon by gravity.

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