

[54] LEAF SEPARATOR

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[51] Int. Cl. B07c 9/00

[58] Field of Search..... 209/114, 116, 120

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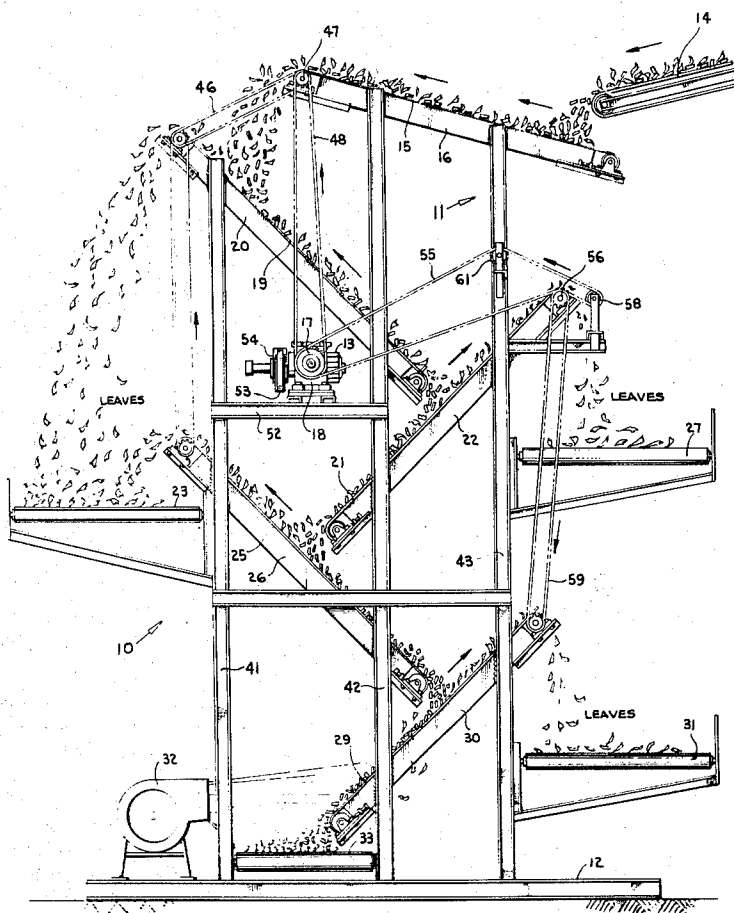
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[57] ABSTRACT

This invention relates to a mechanical leaf separator designed to automatically separate leaf portions and other undesirable components from a cut-up vegetable such as diced celery or the like, using one or more inclined conveyor belts. This novel device is so effective and efficient as to render unnecessary any of the hand labor practices usually associated with the removal of leaf portions from cut-up produce.

8 Claims, 11 Drawing Figures



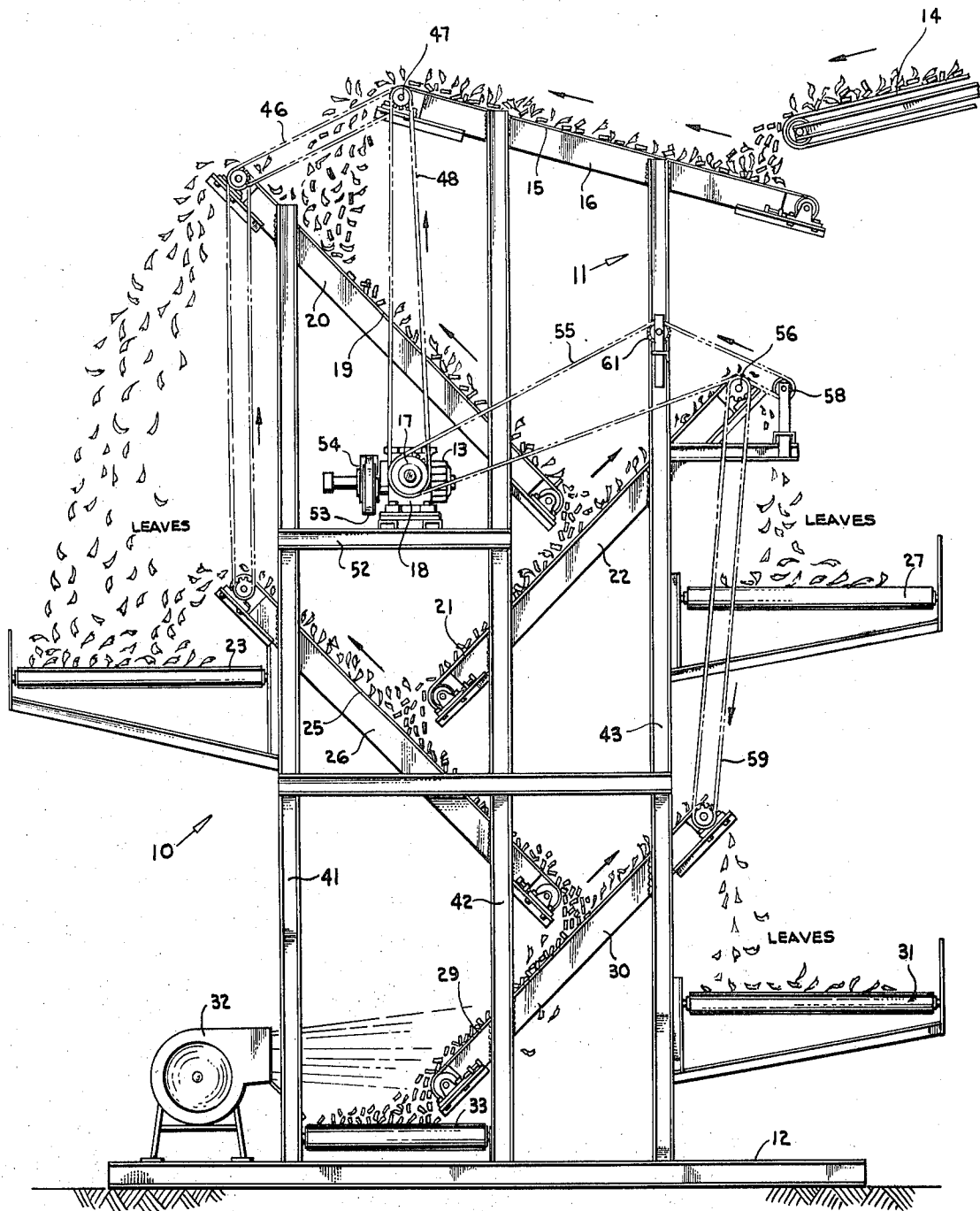
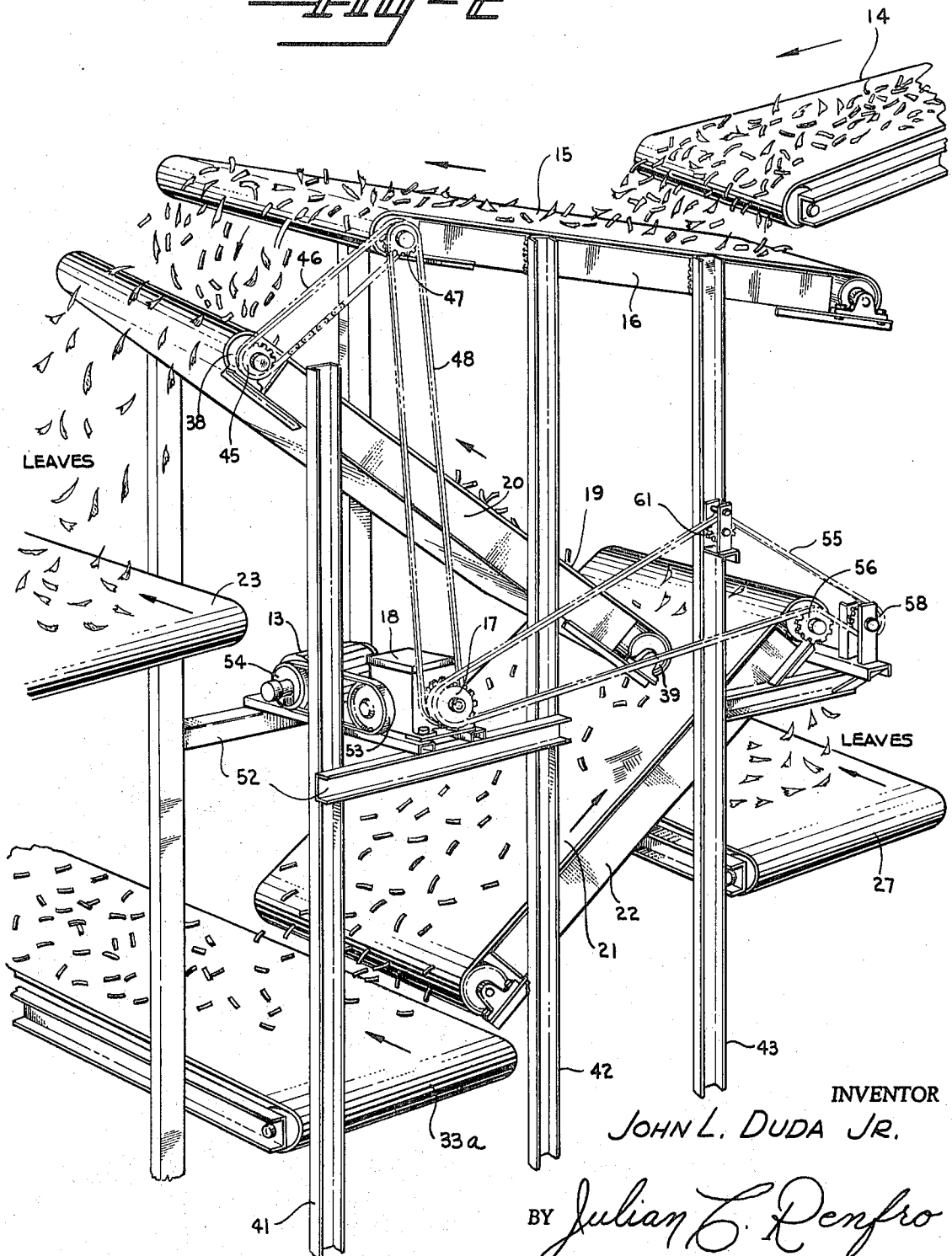


FIG. 1

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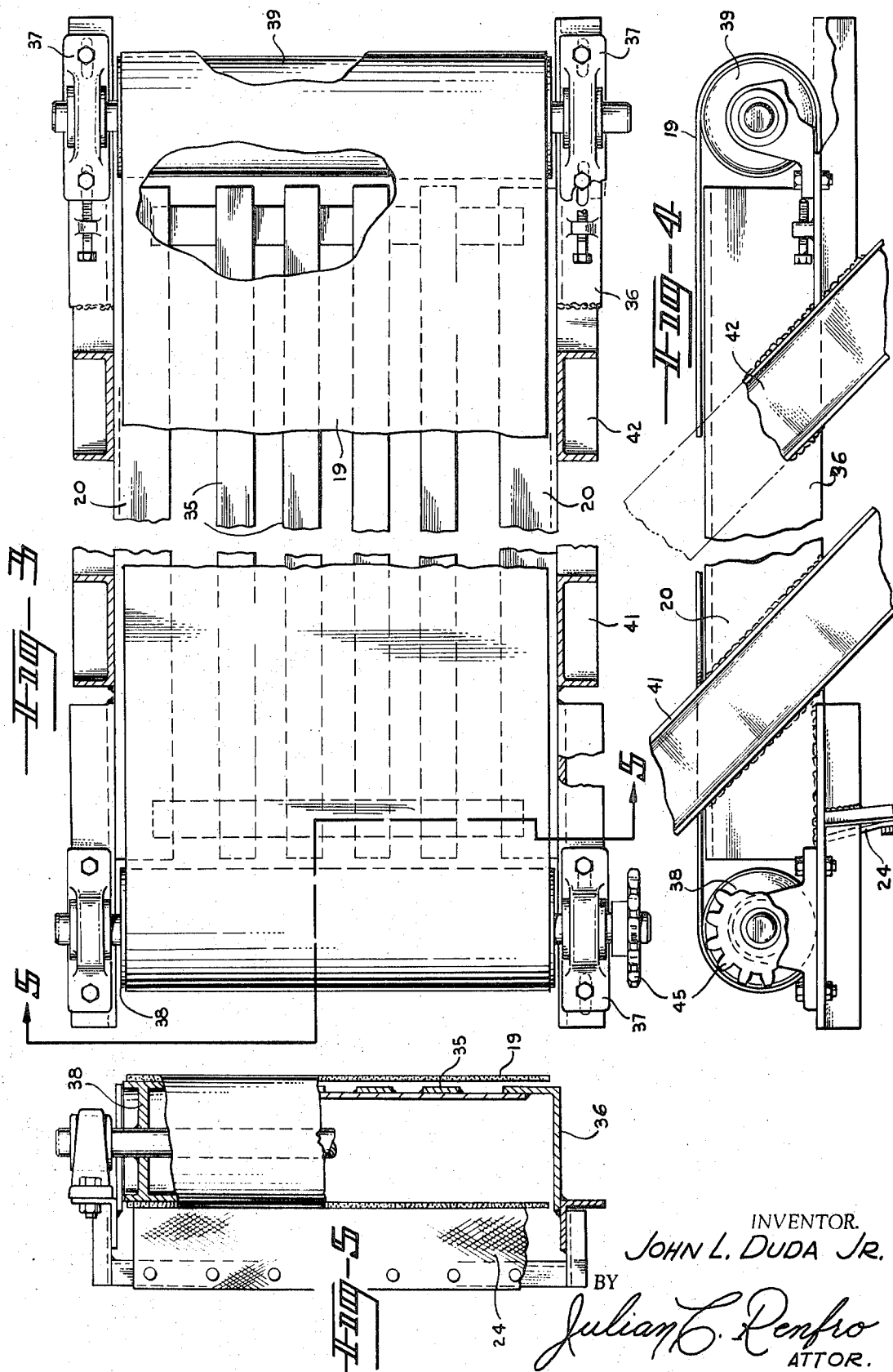
FIG - 2



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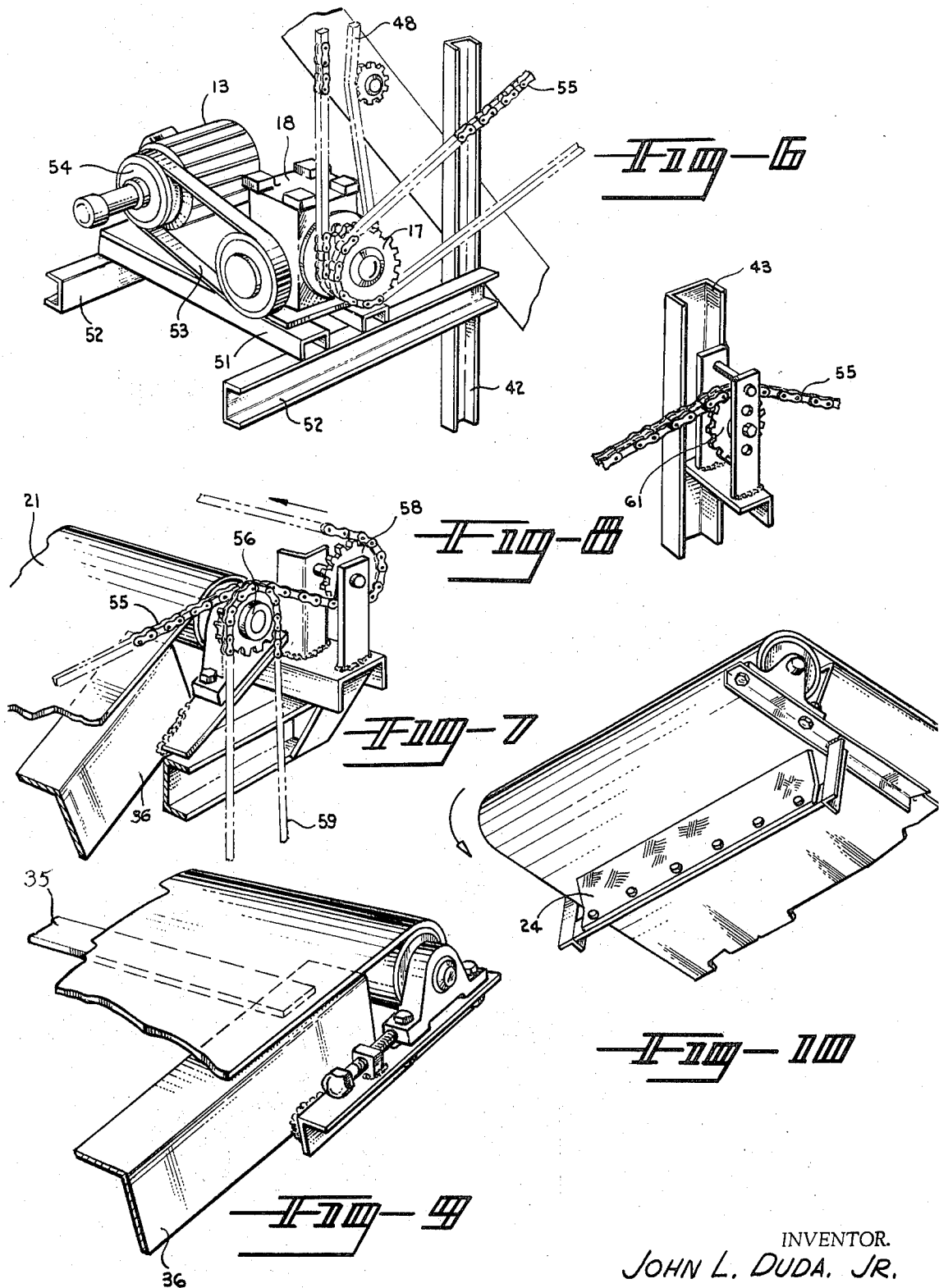
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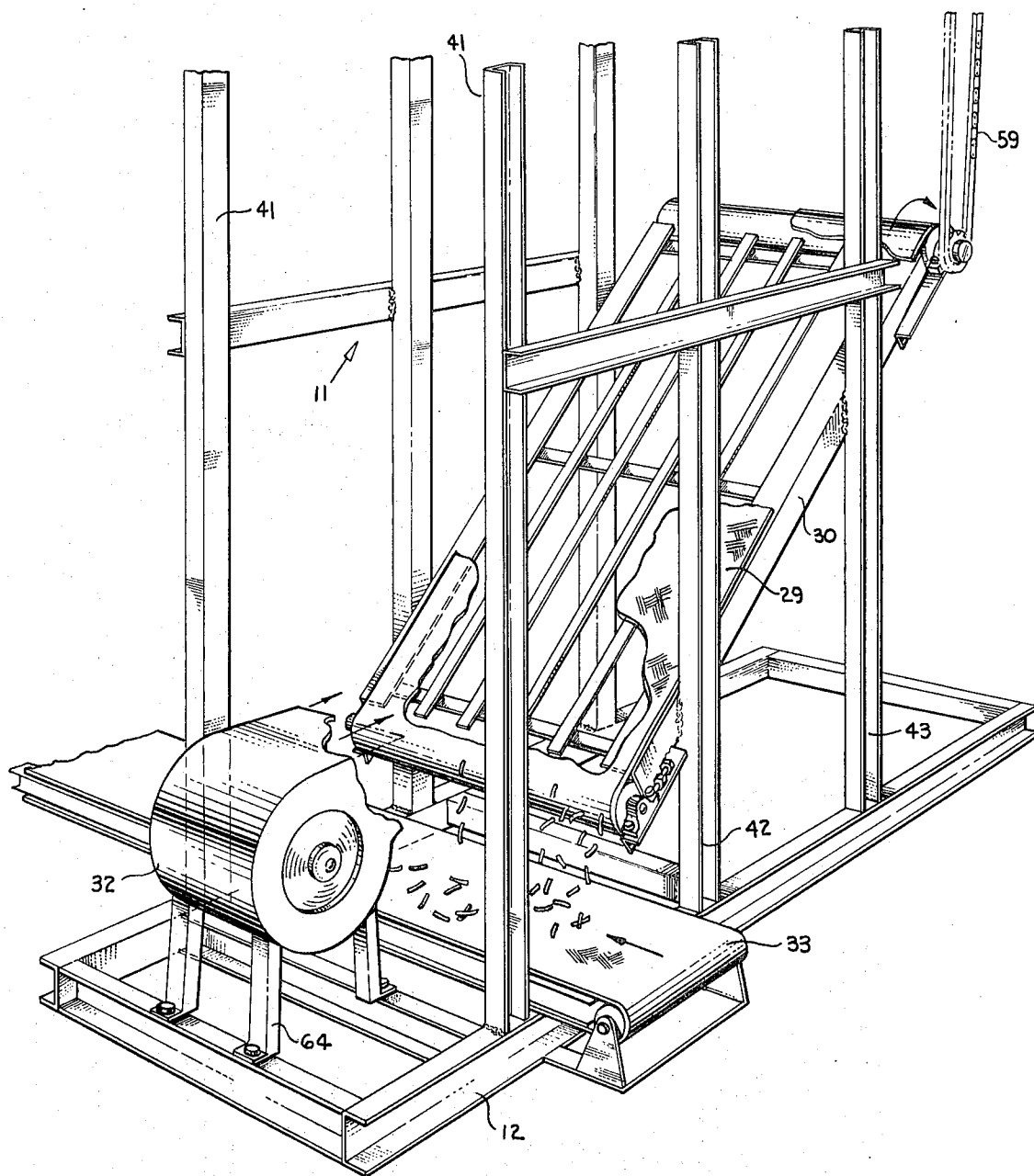


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LEAF SEPARATOR

BACKGROUND OF THE INVENTION

This invention relates to a novel device for separating the usable portions from the unusable portions of certain produce, and more particularly to an arrangement utilizing one or more inclined conveyor belts in order to achieve such a separation automatically and effectively, with little if any hand labor being involved.

In the past, when a crop such as celery was to be packaged, it was customary to employ a number of people to cut up or dice the celery so that it could then be cooked and canned. However, this was a slow, tedious and expensive procedure. Thereafter, modern equipment was utilized for cutting up the celery into small pieces, but all too often some of the leaves of the celery plant got mixed in with the edible celery portions, and these leaf portions, if allowed to remain, tended to degrade the product. If leaves were to be separated out, it was necessary to employ hand labor for so doing, which of course is slow and expensive.

SUMMARY

In accordance with the present invention, I have provided a novel arrangement of inclined conveyor belts for achieving automatically a separation of the leaf portions from mechanically cut up celery or other vegetable, thus making it possible to process and sell the desirable portions of the celery plant without any hand labor being involved in removing undesirable portions such as leaves.

My invention is based on the principle that when cut up mixtures of leaf portions and edible portions are dropped onto a rather steeply inclined conveyor belt whose upper surface is moving in the upward direction, the leaf portions will tend to remain on the belt and to travel to an upper location for disposition as waste, whereas the diced or cut up portions will tend to roll down the belt under the influence of gravity, in the opposite direction to the travel of the belt. Thereafter, it is only necessary to accumulate these portions rolling down the belt in a given location for processing and canning, without any handwork being required. While I may construct a machine utilizing only a single steeply inclined conveyor belt, it is within the purview of my invention to construct and operate a leaf separator employing a plurality of endless conveyor belts, with each lower belt being arrayed and positioned so as to receive the celery portions rolling down off of the next higher belt. Scraper means are provided adjacent the top portion of each successive belt so as to separate out the undesirable portions such as leaves at every opportunity. In this manner a most effective separator arrangement is provided, with the leaf removal procedure being so nearly complete that the product rolling down the final belt is immediately ready for processing and canning procedures. If desired, an air blower arrangement may be utilized at the bottom of the lowermost belt to blow away any undesirable portions remaining so that they will not fall upon the final collecting belt.

It is therefore an object of my invention to provide a separator utilizing gravity to a considerable extent in achieving a very effective separation away of desired components from the undesired.

It is another object of my invention to provide an inclined conveyor belt arrangement for automatically

and rapidly separating usable produce from waste portions.

It is still another object of this invention to provide a separation procedure utilizing a plurality of inclined belts working in concert to assure that no undesirable portions such as leaves remain with the produce separated out for canning.

These and other objects, features and advantages will be more apparent from a study of the enclosed drawings in which:

FIG. 1 is a side elevational view of a leaf separating machine in accordance with my invention;

FIG. 2 is a perspective view of a similar leaf separating machine, but with two of the inclined belts being omitted from the lower portion of the machine in the interests of simplicity;

FIG. 3 is a plan view of a typical belt and belt-frame, with certain portions omitted in the interests of clarity;

FIG. 4 is an edge view of the device shown in FIG. 3;

FIG. 5 is a cross-sectional view taken along the lines 5—5 in FIG. 3;

FIG. 6 is a fragmentary perspective view of the drive arrangement of FIGS. 1 and 2;

FIG. 7 is an enlarged fragmentary view associated with the upper end of inclined belt 21;

FIG. 8 is a fragmentary view of the idler sprocket used in connection with one of the chain drives;

FIG. 9 is a fragmentary view showing the relationship of a belt frame member to a driven roller;

FIG. 10 is a fragmentary view of the underside of a typical belt, revealing the scraper arrangement; and

FIG. 11 is a perspective view, with certain portions removed, illustrating the relationship of the lowermost inclined belt with the belt used to carry away the vegetable portions that had been successfully separated from accompanying leaves.

DETAILED DESCRIPTION

Referring to FIG. 1, it will be noted that I have provided a leaf separator machine 10 utilizing a frame 11 which may be attached to a base 12. Upon this frame a number of inclined conveyor belt arrangements may be operatively arrayed, with the belts being driven by a suitable power source, such as an electric motor 13 arranged to drive a plurality of chains that connect to the drive roller of each belt.

The vegetable portions to be separated from associated leaves are brought in upon a belt 14 from an adjacent machine (not shown), which vegetables are dropped upon uppermost belt 15 of the machine 10, which belt is known as a spreader belt. This belt is similar to the other belts of my machine to the extent that it passes around a belt frame 16, and is driven by means of a chain 48 that extends from the drive gear 17 of the gear box 18 associated with the motor 13. However, the belt arrangement 15 differs from the other belts of my machine in that it is typically disposed at a less steep angle.

As will be noted from FIG. 1 and perhaps even more clearly from FIG. 2, the mixture of vegetables and leaves falling off the end of belt 15 falls upon the upper moving surface of belt 19, which belt is mounted upon a belt frame 20 that is disposed at a steep angle, such as at an angle of 45°. As previously explained, the upper surface of this belt, as well as of the other belts

of my machine, is arranged to travel upwardly, with the arrangement being such that the vegetable portions tend to tumble down the belt under the influence of gravity and fall upon the belt directly below, in this instance on belt 21. In contrast, the leaves tend to stick to the surface of belt 19 and to travel over the uppermost portion of the belt and to fall upon a belt 23 that is arranged to carry the leaves to a remote location for disposal. A scraper 24, such as shown in FIGS. 4, 5 and 10 is arranged to scrape the leaves from the lower side of belt 19 and the other steeply inclined belts, so they will not pass completely around the belts and again mix with the cut up vegetables.

The belt 21 is disposed upon a belt frame 22, and the upper surface of this belt, as previously mentioned, also travels upwardly at a steep angle. As shown in FIG. 1, the vegetable portions tend to tumble down belt 21 and to fall upon belt 25 which is mounted upon belt frame 26, whereas the leaves tending to stick to the surface of belt 21 travel up to the top and over the top and to fall upon belt 27. This latter belt of course transports the leaves to a remote location for disposal, and may be omitted in some instances, where belt 31 can serve both belt 21 and 29. (In FIG. 2, which represents a foreshortened version of the device of FIG. 1, the vegetables fall from belt 21 onto belt 33a used to carry off the cleaned usable produce.)

Belt 25 of FIG. 1 is likewise at a steep angle and the vegetable portions tumble down this belt onto the surface of lowermost inclined belt 29, whereas the leaf portions are carried to the top of belt 25 and thence fall upon the belt 23 for disposal. The vegetable portions falling upon belt 29 tumble down that belt, whereas the leaves are carried to the top of the belt and dropped upon the belt 31, which carries them away for disposal. The vegetable portions tumbling down the belt 29 pass through a blast of air designed to blow away the remaining leaves, this air emanating from a blower 32. The belt 33 of FIG. 1 catches the vegetable portions, which are now devoid of leaves, and carries them to a location for final processing, such as to be processed for canning.

Perspective FIG. 2 reveals certain details of my apparatus in a perhaps clearer manner, such as the chain arrangements utilized for powering the inclined belts. Despite the omission of belts 25 and 29 from this view for clarity reasons, the principles are the same as in the embodiment according to FIG. 1.

Referring to FIG. 3, a typical belt frame is illustrated, such as frame 20. This frame is to be seen to involve a number of metallic slat members 35 designed to reside just under the upper surface of the belt 19, so as to lend support thereto. This figure as well as FIG. 5 reveal the use of side members 36, adjacent the ends of which are adjustably attached the bosses 37 used to house the bearings associated with the driving roll 38 and the driven roll 39 over which the belt 19 passes. The channel-shaped, vertically-disposed frame members 41 and 42 of FIGS. 1 and 2 appear in cross section in FIG. 3, which members are typically welded to the side members 36 of frame 20, as seen in FIG. 4.

FIGS. 3 and 4 also reveal that the driving roll 38 is equipped with a sprocket 45 around which passes the drive chain 46. As shown in these two figures, a single sprocket may be used, with the other part of chain 46 extending around one component of a double sprocket 47 adjacent belt 15; see FIG. 2. The double sprocket 47

is of course driven by the previously-mentioned chain 48 that takes its power from the double sprocket 17 associated with the gear box 18. As an alternative to the showing of FIGS. 3 and 4, a double sprocket may be used in connection with the drive of belt 19, so that as shown in FIG. 1, the belt 25 can conveniently be chain driven. FIGS. 3 and 4 also show the adjustment details by means of which the driven roll 39 can be moved in the direction away from the driving roller, so as to assure the desired degree of tightness of the belt 19. FIG. 4 further shows scraper 24 used for removing leaves from the underside of the belt. FIG. 5 shows a typical cross section taken at a plurality of locations near the left-hand end of the belt 19 shown in FIG. 3.

Turning to FIG. 6 it will be noted that I have there revealed the power source in greater detail, typically involving an electric motor 13 and gear box 18 mounted on a common base 51 and supported by horizontally disposed frame members 52 that are in turn secured to vertical frame members 41 and 42. A chain or fan belt 53 may connect the motor and the gear box, although I prefer the use of a fan belt in order that I may then employ a variable speed pulley 54 and thereby be able to adjust the speed of operation of my device within certain limits.

The output portion of the gear box is equipped with a double sprocket arrangement 17, as previously mentioned, and from these extends chain 48 that is arranged to pass around one sprocket of double sprocket 47 associated with belt 15, and chain 55, which as shown in FIG. 1 is arranged to drive the double sprocket 56 associated with belt 21. In latter instance, the chain 55 passes over one portion of the double sprocket, with an additional sprocket 58 being utilized as shown in FIG. 7 to assure good contact with the sprocket 56. Also as shown in FIG. 7, a chain 59 extends downwardly from the other sprocket of the double sprocket, so as to drive the sprocket of belt 29. See also FIG. 1.

FIG. 8 reveals an idler adjustment sprocket 61 mounted on frame member 43 of FIG. 1, which sprocket may be utilized in conjunction with chain 55, not only to offer an additional arrangement for tightening the chain, but also to prevent interference of an upper reach of the chain with the sprocket 56.

FIG. 9 shows other details of a belt frame, whereas FIG. 10 reveals the underside of a belt frame, including scraper 24, that keeps the belt clean of leaves tending to cling to the belt.

FIG. 11 reveals certain remaining relationships, namely the manner in which the vertical frame members 41-43 are attached to the base 12, and the relationship of the lowermost inclined belt 29 of FIG. 1 to the belt 33 designed to carry the vegetable portions to the cannery. Also shown is the arrangement of the blower 32 to the lowermost inclined belt, which blower, as previously mentioned, is designed to blow away any remaining leaves. This blower may of course be mounted on legs 64 that are bolted to the base 12.

As should now be apparent, I have provided a novel mechanical leaf separator arranged to automatically separate leaf portions and other undesirable components from cut-up vegetables or the like, utilizing at least one inclined conveyor belt. This conveyor belt is inclined at a steep angle and arranged to receive on its upwardly moving upper surface the cut up vegetables,

with the angle being sufficiently great that the vegetable portions tend to roll down the belt, to be received at the bottom, whereas the leaves tend to stick to the belt and are carried to the top of the belt and over the top and thence dropped upon a means for disposing of same.

A succession of belts may of course be utilized, with the uppermost belt arranged to receive the cut up vegetables and leaves from a supply source, with of course the cut up vegetables tending to tumble down the belt during its operation, and the leaves tending to stick to the belt and to be carried to a location adjacent the upper portion of the belt for disposal. A second belt is arranged to receive the vegetables tumbling down from the first belt, with the vegetable portions then tumbling down the second belt, whereas any remaining leaf portions tend to stick to the second belt and to be carried to a location adjacent the top part thereof for disposal. Other belts may of course be utilized both for separation of components, as well as for carrying off the vegetables for processing and the leaves for disposal.

I claim

1. A mechanical leaf separator designed to automatically separate leaf portions and other undesirable components from cut-up vegetables or the like comprising at least two steeply inclined, endless, imperforate conveyor belts, whose upper surfaces travel upwardly, with said belts being disposed in an essentially orthogonal relationship to each other, one of said belts being higher than the other and arranged to receive the cut up vegetables and leaves from a supply source, with the cut up vegetables tending to tumble down the higher

belt during its operation, and the leaves tending to stick to the surface of the belt and to be carried to a location adjacent the upper portion of the higher belt for disposal, the second belt being arranged to receive the vegetable tumbling down from the higher belt, which vegetable portions then tumble down the second belt, to be received for further processing, whereas any remaining leaf portions tend to stick to the surface of said second belt and to be carried upwardly to a location adjacent the top part thereof for disposal.

2. The separator as defined in claim 1 in which the vegetable portions tumbling down the second belt are received on a third moving belt.

3. The separator as defined in claim 2 in which said third belt is steeply inclined for achieving additional separation.

4. The separator as defined in claim 2 in which said third belt is utilized for carrying off produce for canning.

5. The separator as defined in claim 1 in which a common power source is utilized for powering all of said belts.

6. The separator as defined in claim 1 in which said belts are operatively mounted upon a common supporting framework.

7. The separator as defined in claim 1 in which additional belts are provided for carrying away the leaf portions for disposal.

8. The separator as defined in claim 1 in which a blast of air is provided adjacent the lowermost belt, to blow away any remaining leaves.

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