

Nov. 11, 1930.

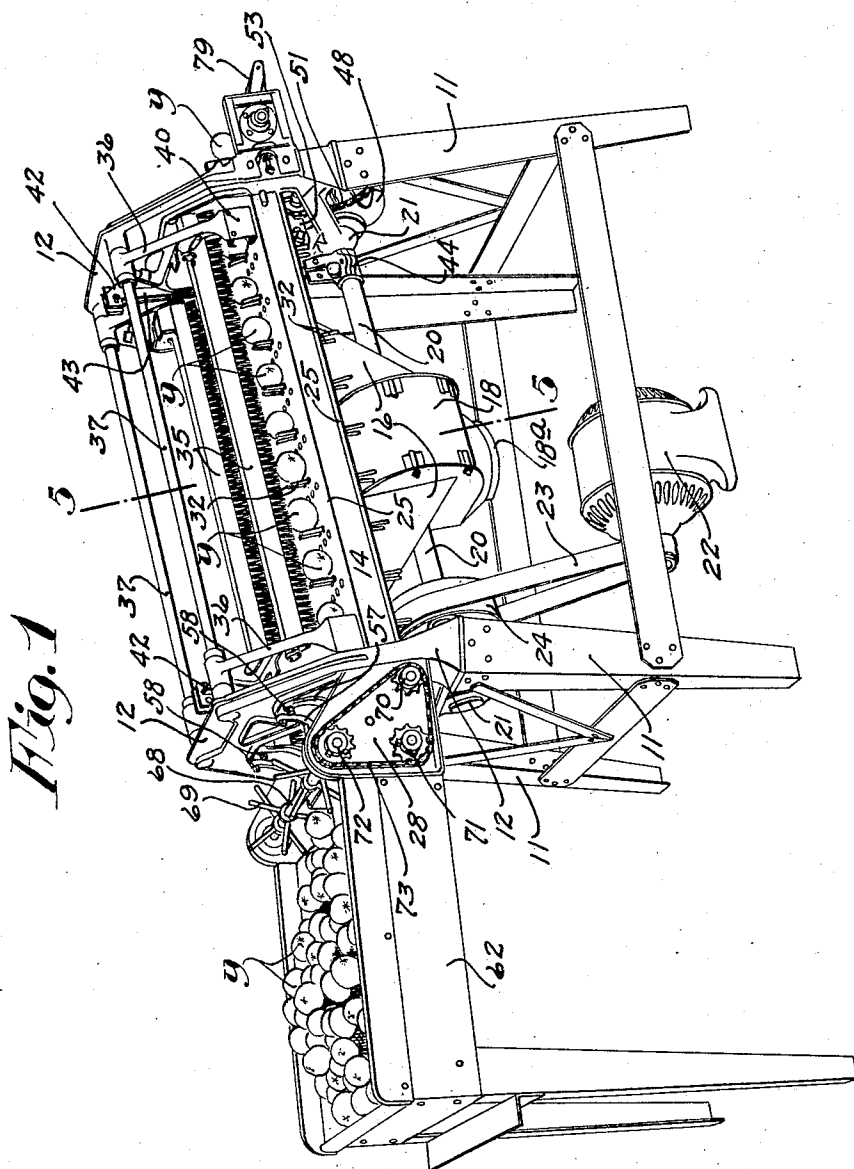
H. A. INGRAHAM

1,780,924

FRUIT CLEANING MACHINE

Filed March 2, 1928

8 Sheets-Sheet 1



Inventor
Harry A. Ingraham
By his Attorneys
Wichard & Wilgore

Nov. 11, 1930.

H. A. INGRAHAM

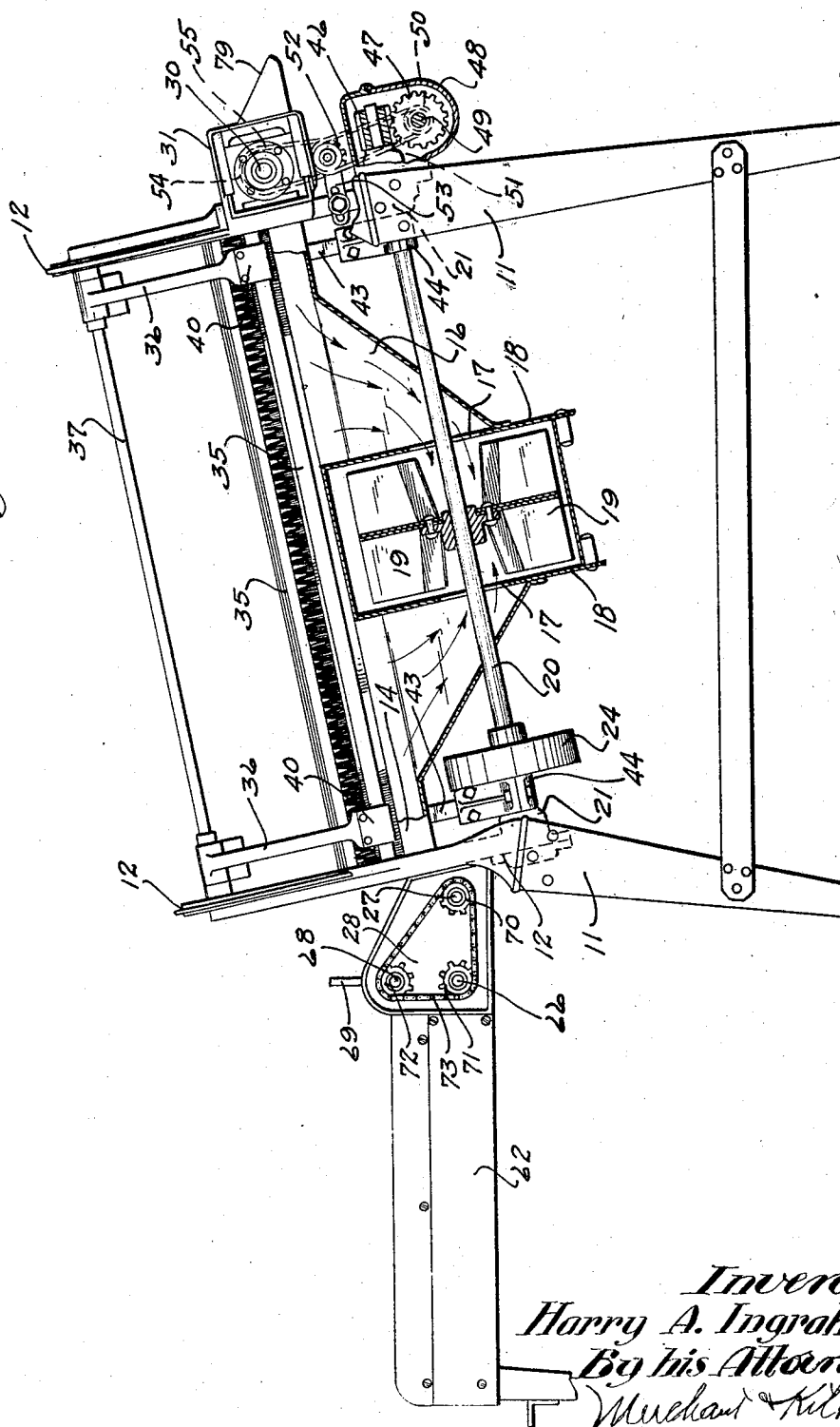
1,780,924

FRUIT CLEANING MACHINE

Filed March 2, 1928

8 Sheets-Sheet 2

Fig. 2



Nov. 11, 1930.

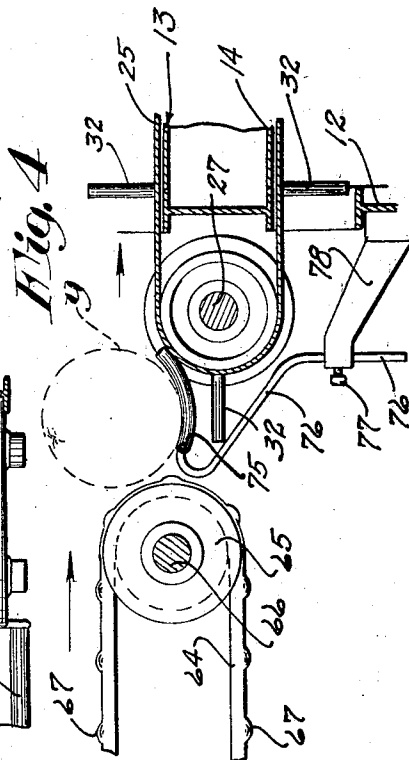
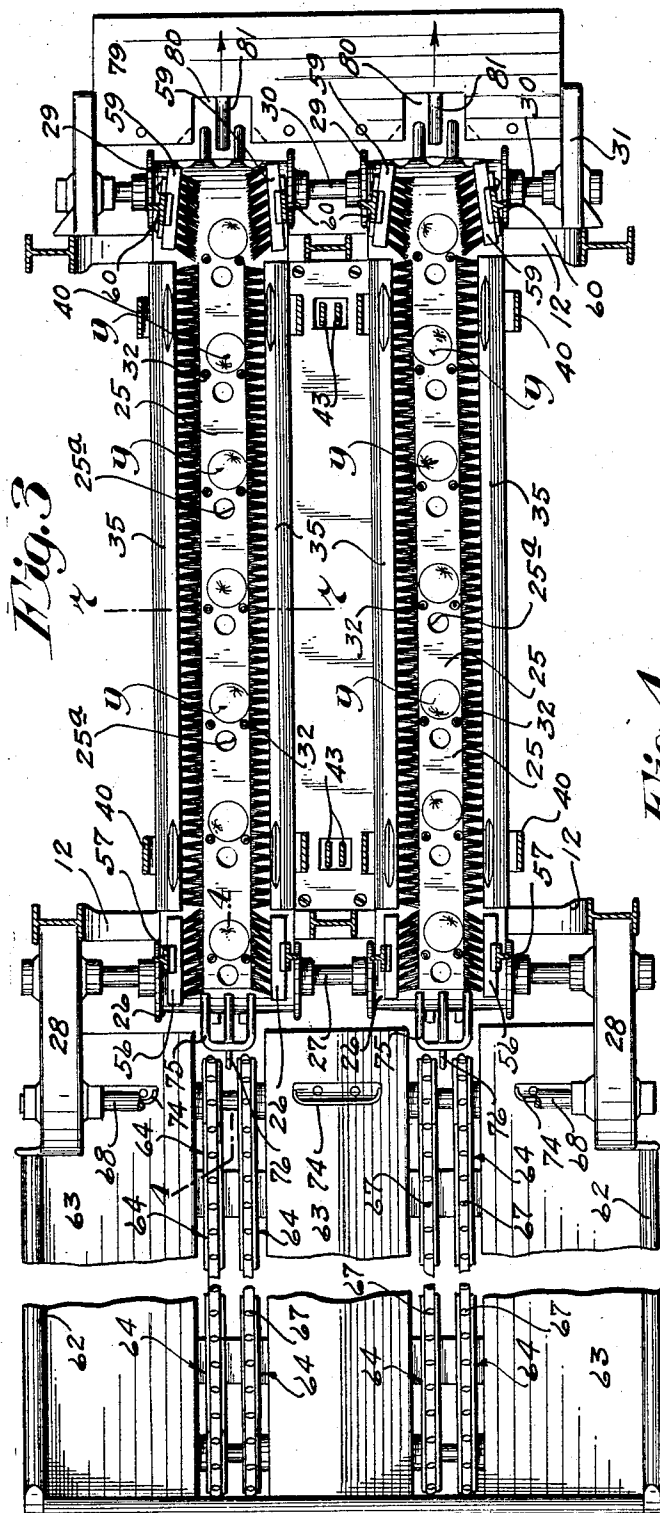
H. A. INGRAHAM

1,780,924

FRUIT CLEANING MACHINE

Filed March 2, 1928

8 Sheets-Sheet 3



Inventor
Harry A. Ingraham
By his Attorneys
Murdoch & Kilgore

Nov. 11, 1930.

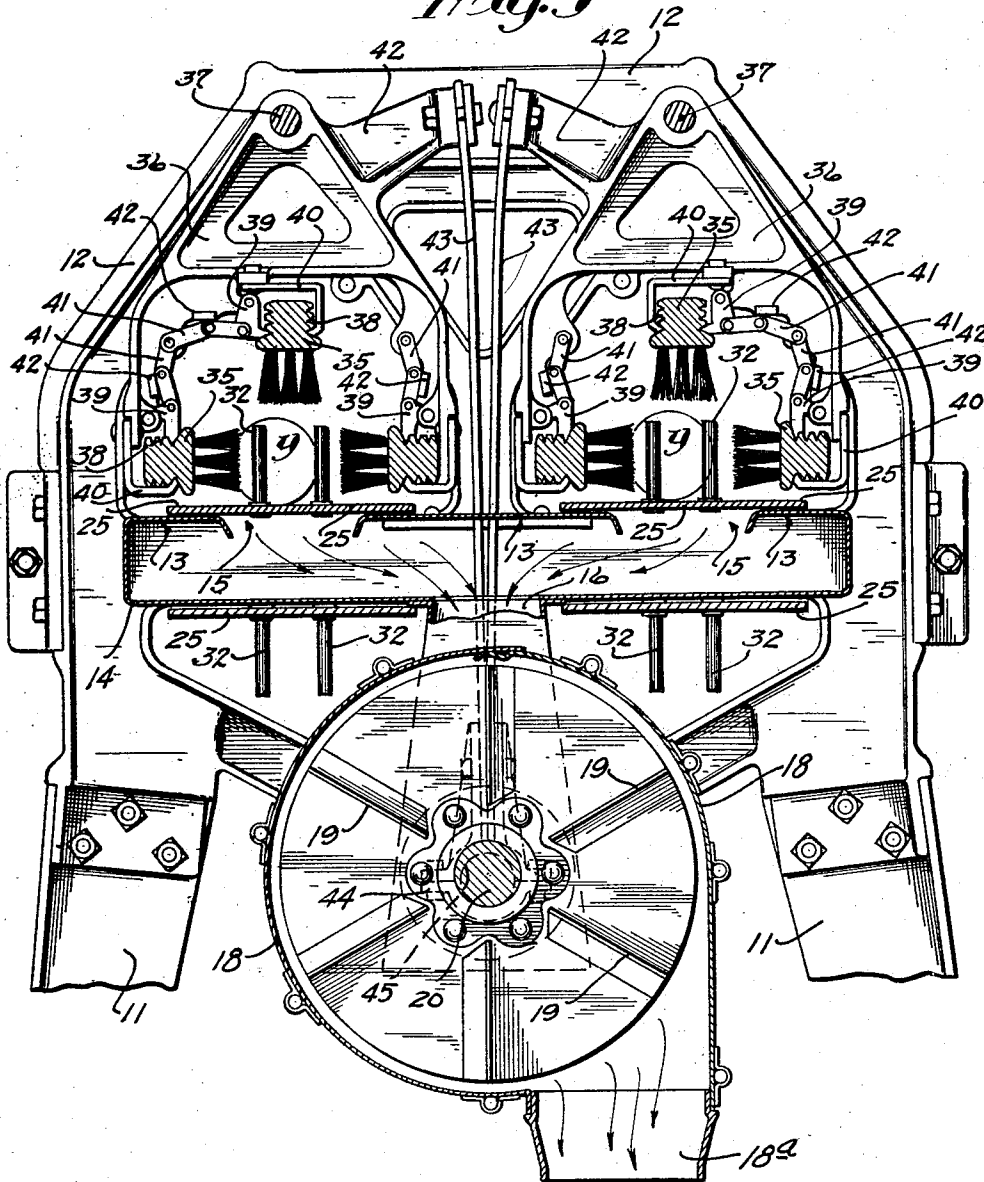
H. A. INGRAHAM
FRUIT CLEANING MACHINE

1,780,924

Filed March 2, 1928

8 Sheets-Sheet 4

Fig. 5



Inventor
Harry A. Ingraham
By his Attorneys
Wichard & Kilgore

Nov. 11, 1930.

H. A. INGRAHAM

1,780,924

FRUIT CLEANING MACHINE

Filed March 2, 1928

8 Sheets-Sheet 5

Fig. 6

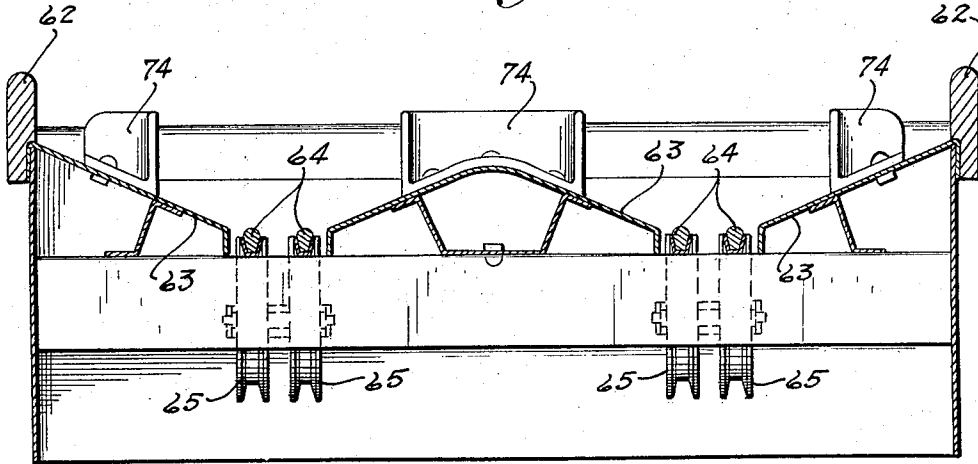
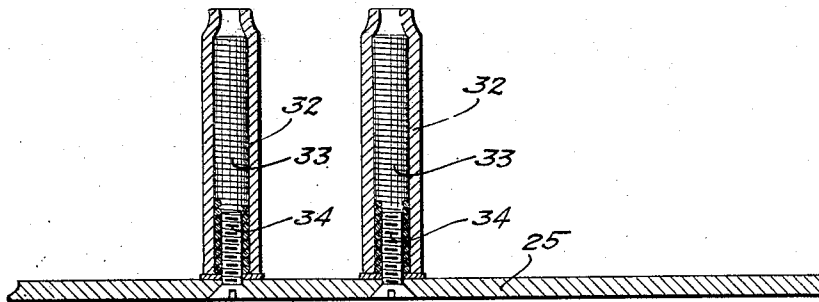


Fig. 7



Inventor
Harry A. Ingraham
By his Attorneys
Wheeler & Kipore

Nov. 11, 1930.

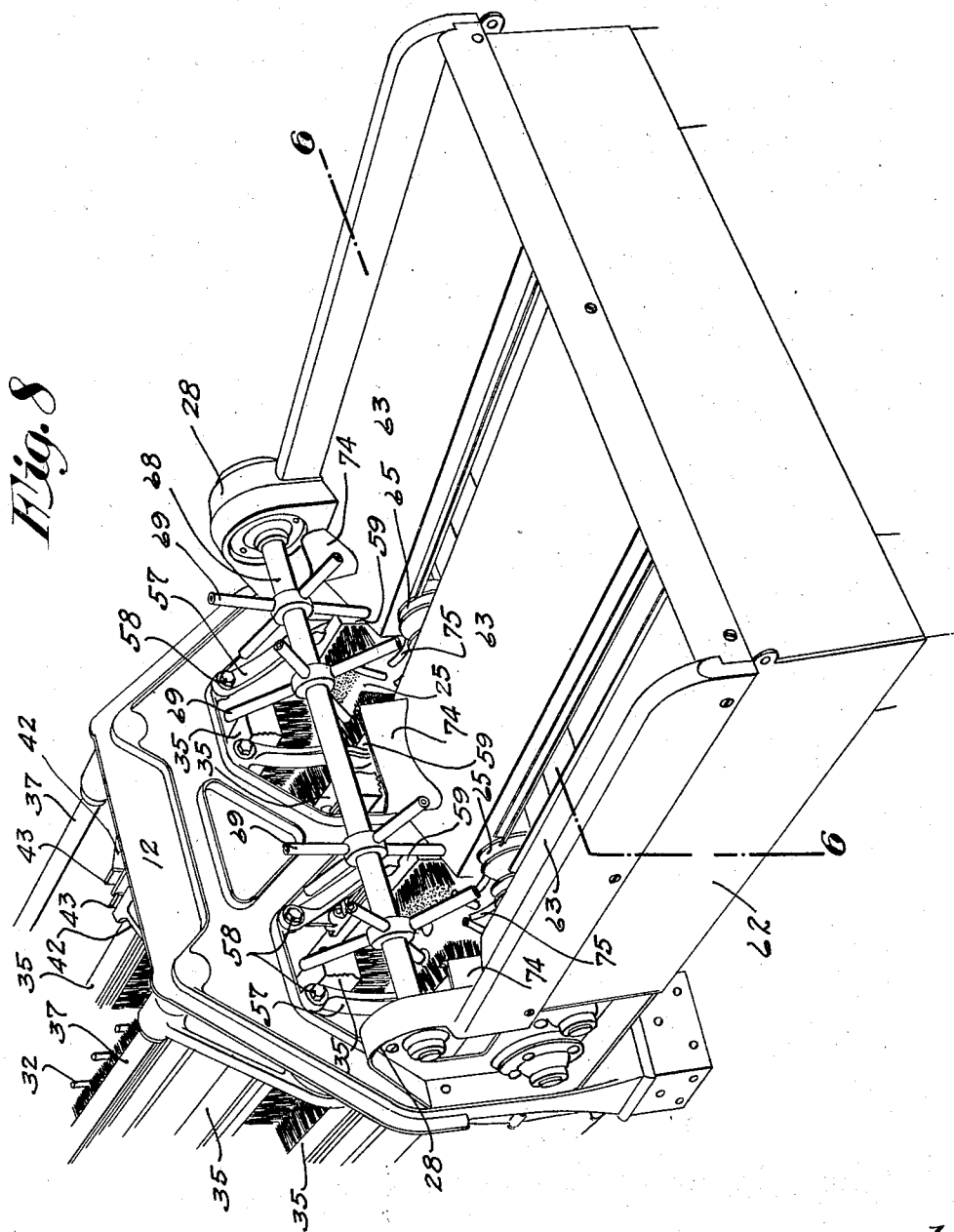
H. A. INGRAHAM

1,780,924

FRUIT CLEANING MACHINE

Filed March 2, 1928

8 Sheets-Sheet 6



Inventor
Harry A. Ingraham
By his Attorney
Wichard Kilgore

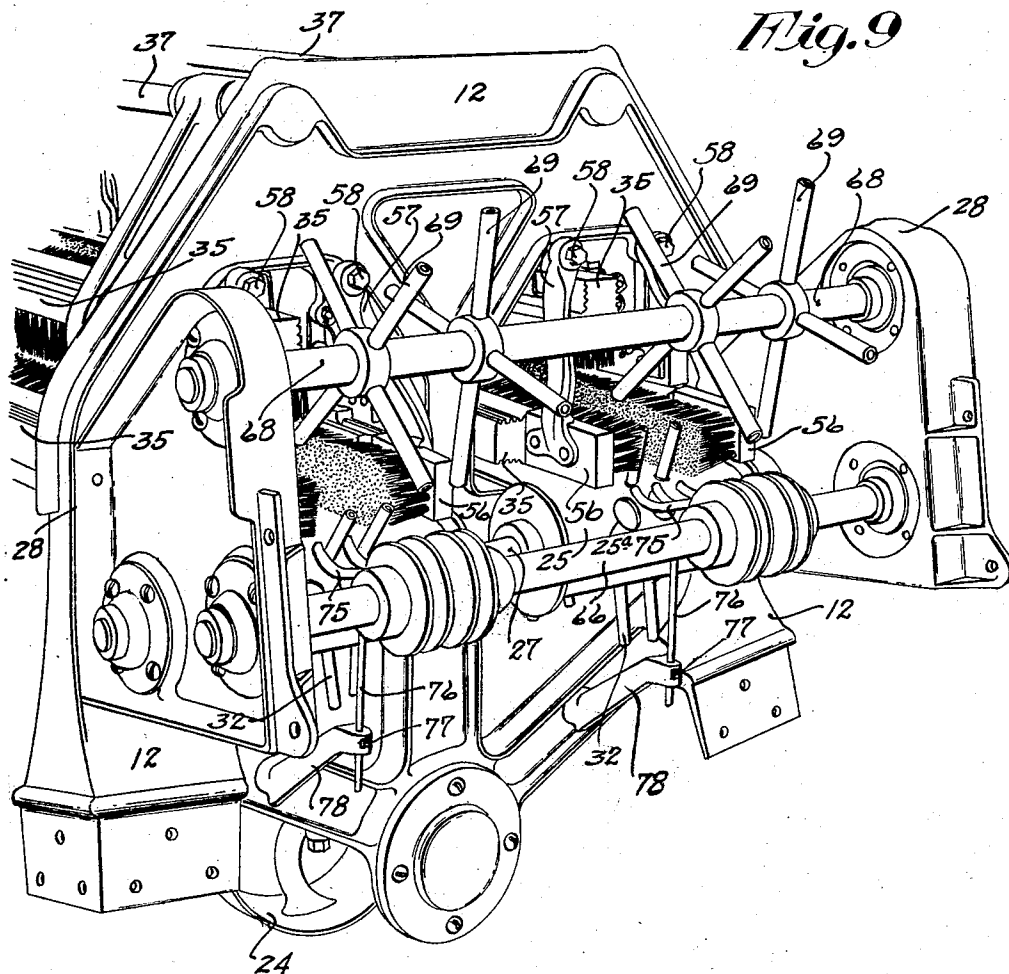
Nov. 11, 1930.

H. A. INGRAHAM
FRUIT CLEANING MACHINE

1,780,924

Filed March 2, 1928

8 Sheets-Sheet 7



Inventor
Harry A. Ingraham
By his Attorneys
Merchand Kilgore

Nov. 11, 1930.

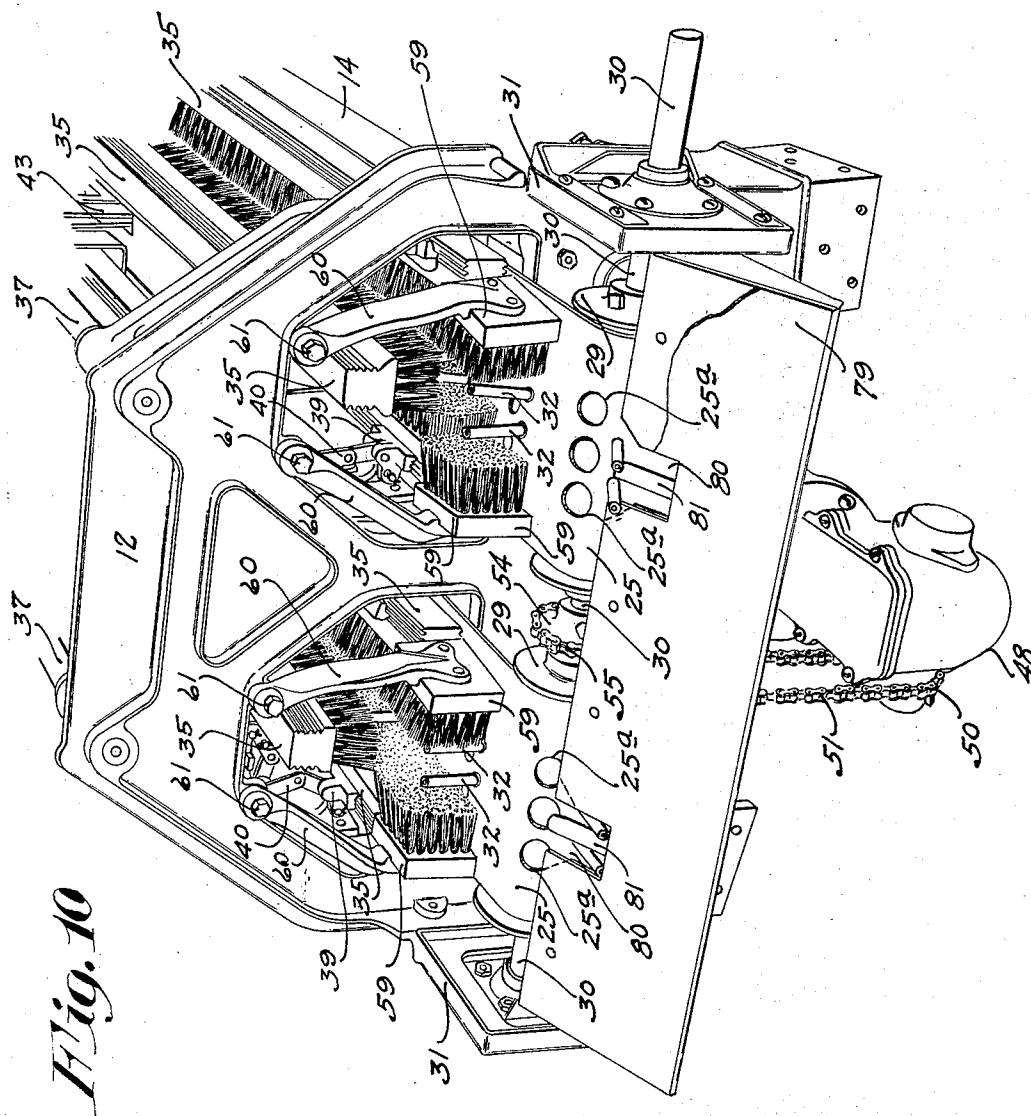
H. A. INGRAHAM

1,780,924

FRUIT CLEANING MACHINE

Filed March 2, 1928

8 Sheets-Sheet 8



Inventor
Harry A. Ingraham
By his Attorneys
Mitcham & Kilgore

UNITED STATES PATENT OFFICE

HARRY A. INGRAHAM, OF ZILLAH, WASHINGTON

FRUIT-CLEANING MACHINE

Application filed March 2, 1923. Serial No. 258,480.

My present invention relates to machines for removing from fruit dust or like deposits resulting from spraying with Bordeaux mixture, arsenate of lead, and other insect or fungus-destroying liquids. The deposits resulting from such spraying operations are in most instances poisonous and in all cases so objectionable that laws have been passed making removal of these deposits necessary before apples and other sprayed fruit can be placed on the market.

The present improved machine is in the nature of a modification of or refinement of the machine disclosed and broadly claimed in my prior application, S. N. 162,023, filed January 19, 1927, and the drawings accompanying this application illustrate a commercial machine that has been extensively sold and used and has been found very highly efficient for the removal of dried sprayed deposits from apples and the like.

Referring to the drawings, wherein like characters indicate like parts throughout the several views:

Fig. 1 is a perspective view showing the complete machine;

Fig. 2 is a side elevation of the machine shown in Fig. 1, some parts being broken away and some parts being in vertical longitudinal section;

Fig. 3 is a plan view of the machine showing some parts being broken away and some parts in section;

Fig. 4 is a fragmentary view with some parts sectioned on the line 4—4 of Fig. 3;

Fig. 5 is a transverse section taken on the line 5—5 of Fig. 1, some parts being broken away;

Fig. 6 is a transverse section taken on the line 6—6 of Fig. 8;

Fig. 7 is a detail showing a portion of one of the feed belts in section on the line 7—7 of Fig. 3;

Fig. 8 is a perspective view showing the receiving end of the machine;

Fig. 9 is a perspective view similar to Fig. 8 but with the supply hopper removed; and

Fig. 10 is a perspective view showing the delivery end of the machine, some parts being broken away.

The running parts of the machine referred to are mostly mounted upon a framework made up chiefly of braced legs 11, end brackets 12 and a longitudinally inclined deck 13 in which the latter, in accordance with one feature of the invention, is formed as the top of an air trunk 14 that is rigidly connected to the end brackets 12. The machine illustrated is a duplex or two-section machine and hence the deck 13 is formed with two large longitudinally extended openings 15 that afford air passages and clearance spaces, the purpose of which will be hereinafter more fully considered. The bottom of the air trunk 14 is connected by a large longitudinally upwardly flaring suction spout 16 to the intake ports 17 of a fan casing 18 (see particularly Figs. 2 and 5), which fan casing is provided with a suitable air discharge port 18^a. Working in the fan casing 18 is a fan head 19 carried by a longitudinally extended countershaft 20 journaled in suitable bearings 21 on the end brackets 12. As shown, shaft 20 is driven from a small electric motor 22 through a motor-driven belt 23 that runs over a pulley 24 on said shaft. Flexible endless traveling conveyor belts 25 are arranged to run over the deck 13 and back under the air trunk 14. The upper and operative portions of these belts cover the long and wide openings 15 so that the upper portions of said belts are supported with freedom for vertical vibration. Beyond the receiving end of deck 13 the belts 25 run over pulleys 26 carried by a transverse shaft 27 journaled in bearing brackets 28 rigidly secured to the end brackets 12. Beyond the delivery end of deck 13 the belts 25 run over pulleys 29 carried by a transverse countershaft 30 journaled in bearing brackets 31 rigidly secured to the adjacent end frame 12. The belts 25 are provided with projecting spacing fingers or devices that will hold the apples or the like spaced apart during the cleaning operation; and preferably, these spacing devices are afforded by small rubber tube sections 32 telescoped over coiled springs 33 anchored to the co-operating belts by screws 34 applied, as best shown in Fig. 7. These spacing devices

are thus made very flexible and being covered with rubber or similar pliable material will not damage the fruit. In Fig. 3, apples being passed through the machine are indicated by the character γ .

In the present application, as in my prior application above identified, vibratory brushes are co-operatively arranged with respect to each other and with respect to the feed belts so as to afford runways through which the apples or fruit will be passed in the cleaning operation. For each feed belt there is provided three long parallel brushes 35, two of which are placed immediately over the co-operating belt with their bristles projecting horizontally inward but spaced apart, while the third brush is spaced over the co-operating belt with its bristles projecting downward, the relative arrangement being best shown in Fig. 5. In this improved machine, each group of three brushes is carried by a rocking or oscillatory support made up of rocker brackets 36 secured to a rock shaft 37 journaled in the end brackets 12. The several brushes are made readily adjustable to vary the cross section of the apple or fruit runway. For this accomplishment the wooden bars of the several brushes are formed with parallel longitudinal grooves 38 that are engaged by the points of co-operating grapples 39 and 40, the former of which are pivoted to the adjacent rocker brackets 36 and the latter of which are bolted or otherwise rigidly attached to said rocker brackets but have a slightly springing or heeling action. The pivoted brackets 39 are operated by toggles 41 that connect the same to the brackets 36. When the toggles 41 are turned slightly beyond dead centers and against stop lugs 42 on the brackets 36 the grapples will be locked against the brushes and the brushes will be firmly held. Release of the brushes will be accomplished by turning the toggles 41 inward. Obviously the grapples will engage any of the grooves 38 of the brushes and hence will hold the brushes in differently set positions.

The two brush supports are given simultaneous oscillatory movements in reverse directions so that the momentum of the one will offset the other and thereby practically neutralize or eliminate vibration in the machine. For imparting the above noted vibratory motions to the brush supports the rocker brackets 36 at both ends of the machine are provided with projecting arms 42 that are bolted or otherwise secured to the upper ends of resilient metal straps 43. The lower ends of the two co-operating straps 43 at each end of the machine are connected to common eccentric straps 44 that work on eccentrics 45 carried by the motor-driven shaft 20. The belts 25 are driven in a direction to carry the apples from the left toward the right in respect to Figs. 1, 2 and 3. As shown, this

drive is accomplished through drive best shown in Figs. 2 and 10. The motor-driven shaft 20 is provided at the delivery end of the machine with a worm 46 that meshes with a gear 47, shown as mounted in the gear casing 48 on the main frame. Worm gear 47 is secured to a short shaft 49 journaled in the housing 48 and provided at its outer end with a sprocket 50. A chain 51 runs over the sprocket 50 and over one section of a double faced sprocket 52 carried by a bearing 53 that is adjustably secured to the main frame. On the pulley shaft 30 is a sprocket 54. A sprocket chain 55 runs over the sprocket 54 and over the other face or section of the double faced intermediate sprocket 52. Through the connections described the conveyor belts 25 will be driven in the direction above stated. The feed belts 25 are provided with large openings 25^a that move in communication with the long passages 15 in the desk 13 for a purpose which will hereinafter appear.

As already stated the brushes 35 are arranged to be oscillated transversely of the runways and of the line of travel of the fruit through the machine. For directing the apples or fruit to the respective runways afforded by the brushes 35 and co-operating belts 25 there is provided for each runway a pair of receiving brushes 56 set with their bristles spaced apart but endwise projecting inward. These receiving brushes 56 are aligned as nearly as possible with the runways formed between the vibratory brushes, and as shown they are rigidly secured to the lower ends of supported arms 57, the upper ends of which are connected to the adjacent end bracket 12 by machine screws 58 or the like, which, when tightened, securely hold said arms and hence the brushes 56 in the desired adjustments against accidental or unintentional movements. For the construction just described, see particularly Figs. 3, 8 and 9.

At the delivery or discharge ends of the runways formed between the vibratory brushes 35, are short laterally spaced delivery brushes 59 secured to the lower ends of supporting arms 60 which, at their upper ends, are connected to the adjacent end frame 12 by a machine screw 61 or the like which, when tightened, securely holds said arms 60 and brushes 59 in set positions. For the construction just described, see particularly Figs. 3 and 10.

For supplying the applies to the runways formed between the brushes above described, there is provided a sort of duplex hopper and co-operating supply belts, which latter secure and automatically deliver the applies or fruit to the respective runways. The preferred form of this hopper is best shown in Figs. 1, 3, 6 and 8, and, as shown, it comprises a leg-equipped table 62 attached one

end to the adjacent end bracket 12 and provided with a deck formed with parallel depressed hopper-like channels 63. The hopper channels 63 have longitudinally slotted bottoms in which are arranged to run pairs of parallel supply belts 64. The belts 64 run over group pulleys 65 carried by transverse shaft 66 journaled in the framework of the table 62. The belts 64, as shown, are provided with projecting lugs or knobs 67 that assist in feeding the action.

Journaled in the journal brackets 28 and extended transversely over the shaft 66 and pulleys 65, is a shaft 68 that is provided with radially projecting arms 69. The arms 69 are in circumferentially spaced groups and there is a laterally spaced group for each runway. The arms 69 are very flexible and are preferably short sections of rubber hose secured at their radially inner ends to hubs on the shafts 68. These arms operate in the manner noted in the description of the operation. At one side of the machine the shafts 27, 66 and 68, respectively, are provided with sprockets 70, 71 and 72, over which runs a sprocket chain 73. As described, the shafts 66 and 68 and hence the supply belts and agitating reels are driven from the shaft 27. The numeral 74 indicates stop flanges on the delivery end of the hopper deck which are arranged to hold back the apples or fruit except such as are delivered to the supply belts.

To assist in positioning the apples so that they will be picked up one at a time and delivered to the belts 25, there is provided for each runway a so-called positioning device which in the preferred arrangement, is in the nature of a three-tined fork 75 secured to a depending stem 76 which, as shown, by a set screw 77 is rigidly but adjustably secured to an arm 78 projected from the adjacent end bracket 12 (see particularly Figs. 3 and 4). The prongs of the so-called fork 75 are curved or depressed so that they will receive and hold the apples delivered thereto, as best shown by dotted lines in Fig. 4, and thus position the apples, so that they will be picked up by the upwardly moving spacing fingers 32 which latter are arranged to move freely between the prongs of said forks and clear of the stems 76. The clean apples delivered to the delivery brushes 59 will from the latter be carried by the fingers 32 onto a deck 79, which may be assumed to be a sorting deck and which, as shown, is secured to the bearing brackets 31. This deck 79 is provided with notches 80 through which the fingers 32 may move downwardly, and to prevent the apples from passing downward through said notches 80. Stop fingers 81 (see Fig. 3) are secured to deck 79 and projected centrally through the notches 80 between the line of travel of the two rows of fingers 32. Deck 79 is of a flexible material

secured on a metal plate 79^a which at the edges of the notches 80 is beveled at 80^a.

Operation

The fruit, assumed to be apples, is placed in the hopper and will be engaged by the forwardly moving upper brushes of the supply belt 64 and will be crowded forward, some of the apples at the front being pressed against the stops 74. At the center of the hopper channels the apples engaged by the belts 64 will be fed slowly but progressively forward and delivered one at a time upon the positioning devices or forks 75 so that there will always be one apple on each of the forks. As the pairs of fingers 32 of the conveyor belts 25 move upward through the forks they will pick up the apples one at a time and position the same on said belts and hold the apples on the belts always spaced apart. The apples are first moved between the relatively fixed receiving brushes 56 and by the latter will be directed between the vibratory cleaning brushes 35 so that the apples will then be delivered into the respective runways formed each by the three brushes 35 and underlying belt 25. As soon as one apple has been picked off from a positioning fork 75 another will be crowded forward and will take its place on the fork ready to be picked up by the next upwardly moving pair of fingers 32.

As the apples are by the conveyor belts 25 carried between the laterally spaced brushes 35 they will be subjected to a complex vibration produced first by the alternate endwise thrusting actions of the endwise presented bristles of the opposing brushes 35. Under this vibratory movement of the brushes the apples will be thrown back and forth as they are progressively fed forward by the conveyor belts and will be continuously turned so that during the progress through the runways all surfaces of the apples, including their calyxes, will be presented to endwise thrusting action of the brushes. This turning action of the apples is produced in part by the fact that the laterally spaced brushes 35 are located low down so that they tend to make the apples jump to and from the conveyor belts 25. Moreover, the turning of the apples is very greatly facilitated by the fact that the central portions of the flexible conveyor belts 25 are not solidly supported but are hung over the air channels 15 so that the belts themselves will be vibrated vertically, thereby causing the apples to jump upward and more or less against the bristles of the overlying brushes. In a flimsily constructed machine, wherein the whole machine is given a quite violent vibratory movement, it has been found that rotation of the apples would be facilitated by such vibration but in well constructed machines, wherein the strain is relieved from vibration as much as possible,

it has been found to be of the utmost importance that the apple-carrying brushes of the conveyor belts be free so that vibration can be set up therein to increase the tendency of the apples to rotate so that they will be completely and thoroughly cleaned by the brushes under the repeated brush-thrusting actions and contacts. When the machine is in action, quite a strong suction will be produced causing air to constantly move from the brush surfaces and the intervening runways downward through the openings 25^a in the conveyor belts so as to carry the dust brushed from the apples to the fan from which the duct-laden air will be discharged out through the spout 18^a. The brushes are thus kept clean and the accumulation of dust in the cleaning runways is avoided.

As they are carried by the conveyor belts from between the vibratory brushes 25, they will be carried between the bristles of the delivery brushes 59 and by the latter will be directed onto the sorting table 79 or other receptacle where they will be discharged from the action of the engaging fingers 32.

From the above statements, it should be obvious that during the vibratory actions the apples are positively held out of contact, the one with the other, and at no time come into contact with any hard surface such as would bruise or in any way damage the skin of the apples. The brushes 35 are capable of very quick adjustment so as to set the machine for any sized apples or fruit to be cleaned. It is also evident that both in the actions of delivering the apples to the cleaning devices and of discharging the apples from the cleaning devices means is provided for handling the apples without bruising or in any way damaging the same. Of course when the apples reach the so-called sorting table 79 they will be properly taken care of either by a sorter or by other means not necessary for the purposes of this case to consider. The corner portions 9 of the flexible deck 79 where they project beyond the beveled corners 80^a will yield to the depressing action of fruit delivered onto the deck from the fingers 32 of the conveyor belts 25 and thus prevent the fruit from being damaged in the delivery action.

What I claim is:—

1. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, means for holding the fruit spaced while being progressively moved through this runway, and relatively stationary receiving brushes at the receiving end of said runway for delivering the fruit into the runway and between the vibratory brushes thereof.

2. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes

to clean the fruit, means for holding the fruit spaced while being progressively moved through the runway, and relatively stationary spaced delivery brushes at the delivery end of the runway and between the vibratory brushes thereof.

3. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, means for holding the fruit spaced while being progressively moved through the runway, relatively stationary receiving brushes at the receiving end of said runway for delivering the fruit into the runway, and relatively stationary spaced delivery brushes at the delivery end of the runway and between the vibratory brushes thereof.

4. The structure defined in claim 1, in which said receiving brushes are adjustable transversely of the runway.

5. The structure defined in claim 2, in which said delivery brushes are supported for adjustment transversely of the runway.

6. The structure defined in claim 1, in further combination with a fruit positioning device in the space between the receiving ends of said receiving brushes, a hopper with means for delivering the apples one at a time on said positioning device, and means for taking the apples from said positioning device and forcing the same between said receiving brushes.

7. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, a fruit positioning device at the receiving end of the runway, means for delivering the fruit onto said positioning device, means for progressively feeding the fruit through said runway including devices for picking the fruit from said positioning device and carrying the same into said runway, relatively stationary laterally spaced receiving brushes at the receiving end of the runway afforded by the relatively movable brushes, and relatively stationary laterally spaced delivery brushes at the delivery end of said runway.

8. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, means for conveying the fruit through said runway and for holding the same spaced, and means for delivering the fruit to said runway including a rotary shaft having radially projecting flexible arms.

9. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, means for conveying the fruit through said runway and for holding the same spaced, means for delivering the fruit to said runway including a trough-like hopper and at the bottom of said hopper laterally spaced parallel feed belts, and an

overlying rotary shaft having flexible arms.

10. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, an endless conveyor belt 5 affording a bottom to said runway, relatively stationary laterally spaced receiving brushes at the receiving end of the runway, a fruit-positioning device adjacent the receiving ends of said receiving brushes, said conveyor belt 10 having fruit-spacing devices arranged to pick the fruit from said positioning device, and means for directing the fruit one at a time to said positioning device.

11. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing vibratory movement of the brushes to clean the fruit, and a conveyor belt af- 15 fording a bottom to said runway and supported with its central portion free for vertical vibration to assist in the fruit-turning action under vibration produced in the clean- 20 ing action.

12. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing vibratory movement of the brushes to clean the fruit, and a conveyor belt af- 25 fording a bottom to said runway and supported with its central portion free for vertical vibration to assist in the fruit-turning action under vibration produced in the clean- 30 ing action, the said belt having perforations therein for permitting a discharge of dust removed from the fruit.

13. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing vibratory movement of the brushes to clean the fruit, a movable endless conveyor belt, the upper portion of which 35 affords a bottom for the runway, said belt having perforations for the passage of air and dust and having projecting fruit-spacing devices, an air trunk underlying the opera- 40 tive portion of said belt, and means for producing partial vacuum in said air trunk whereby dust-laden air will be drawn from the runway under the fruit-cleaning action.

14. The structure defined in claim 13, in which said air trunk has a slotted top plate 45 that supports the edges of said belt but leaves the central portion thereof free for vertical vibration.

15. In a fruit cleaning machine, cleaning brushes spaced to afford a runway, means for producing relative movement of the brushes to clean the fruit, a movable endless conveyor belt, the upper portion of which affords a 50 bottom for the runway, said belt having perforations for the passage of air and dust and having projecting fruit-spacing devices, an air trunk underlying the operative portion of said belt, means for producing partial vac- 55 uum in said air trunk whereby dust-laden air will be drawn from the runway under the fruit-cleaning action, said air trunk having

a slotted top plate that supports the edges of said belt but leaves the central portion thereof free for vertical vibration, said conveyor belts being extended beyond the ends of the vibratory brushes, and relatively sta- 70 tionary laterally spaced brushes overlying the receiving and delivery portions of said belt in approximate alignment with said vibratory brushes.

16. A feed belt for machines of the kind described having projecting fruit-spacing 75 fingers formed by flexible tubular sections anchored to said belt at one end.

In testimony whereof I affix my signature.

HARRY A. INGRAHAM. 80

85

90

95

100

105

110

115

120

125

130