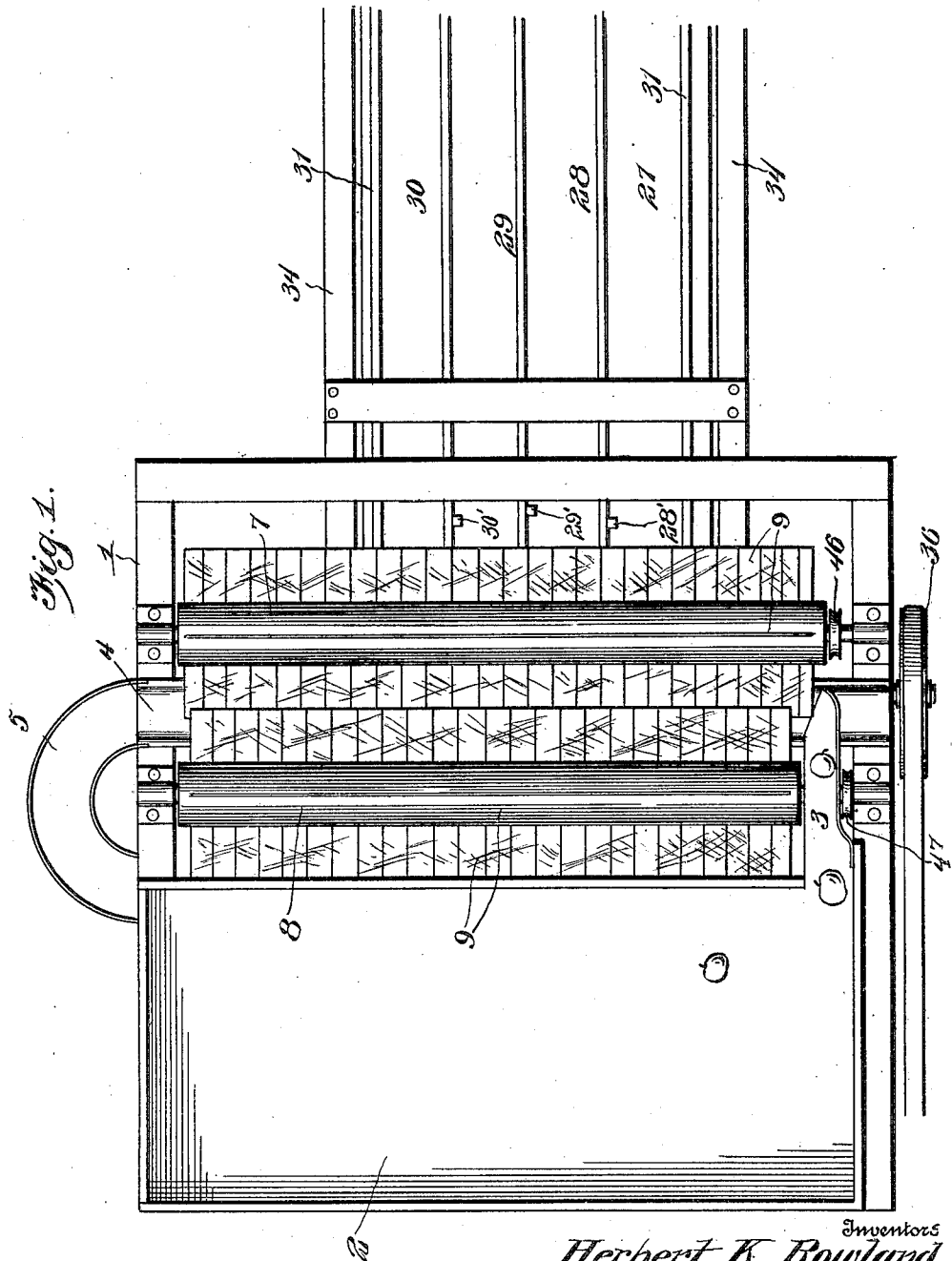


H. K. ROWLAND & L. H. LARSEN.
 FRUIT CLEANER AND GRADER.
 APPLICATION FILED NOV. 23, 1908.

972,026.

Patented Oct. 4, 1910.

5 SHEETS—SHEET 1.



Witnesses

Frederic R. Hennrichs
C. A. Hines

Inventors
Herbert K. Rowland
Lars H. Larsen

By *Victor J. Evans*

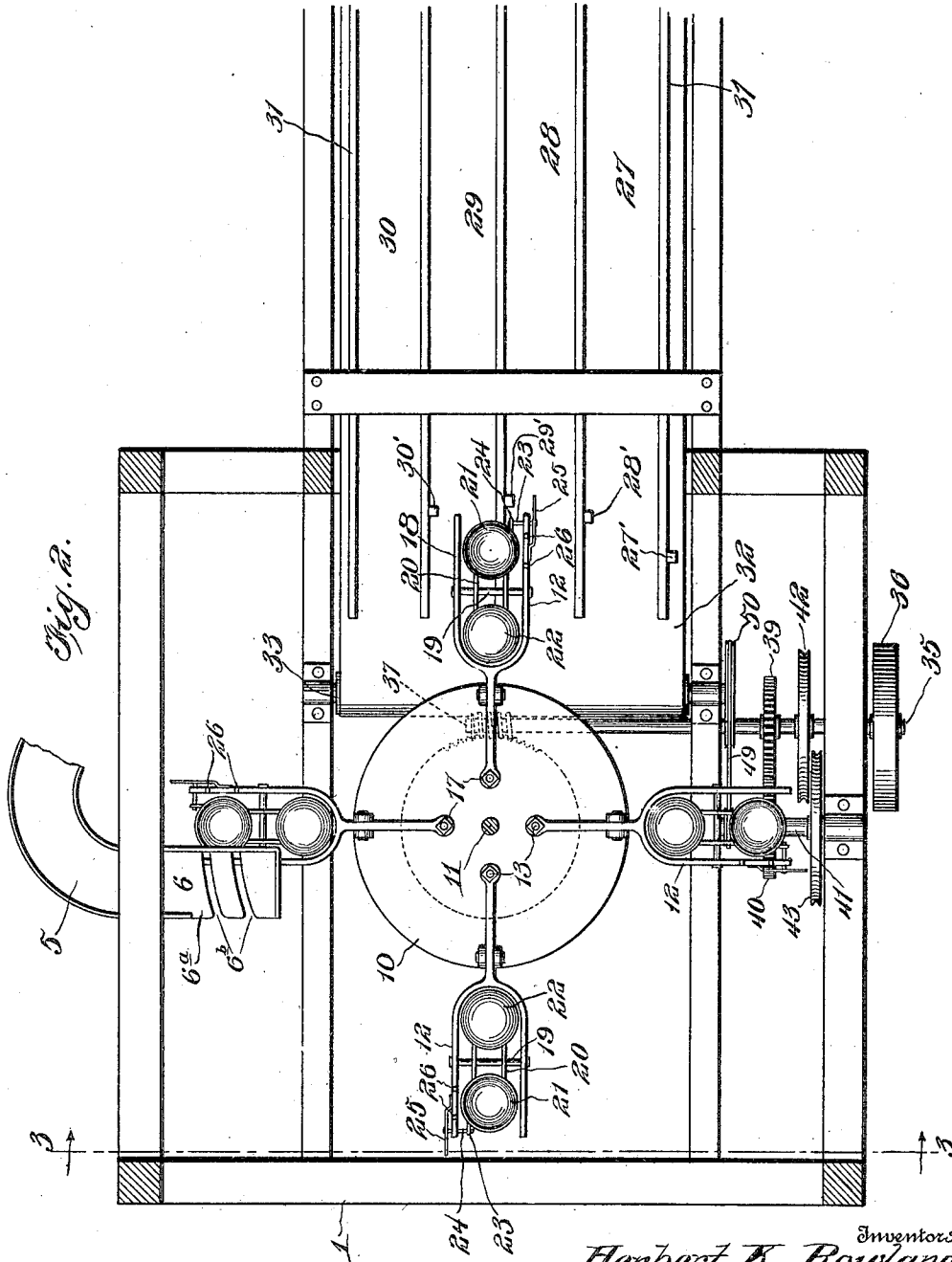
Attorney

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5 SHEETS—SHEET 2.



Witnesses

Louis A. Heinrichs

C. C. Hines

Inventors
Herbert K. Rowland
Lars H. Larsen

By *Victor J. Evans*

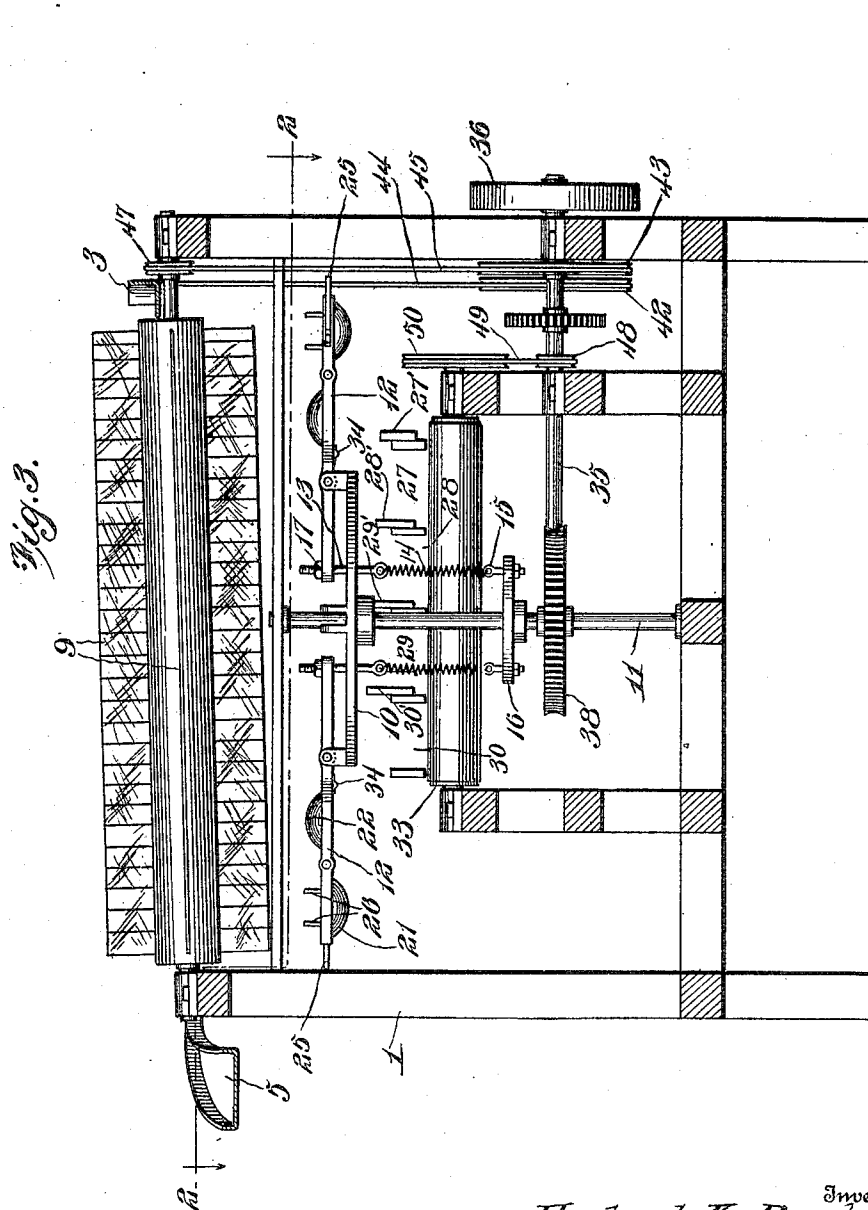
Attorney

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5 SHEETS—SHEET 3.



Witnesses

Louis R. Hennrichs

C. C. Hiner.

Inventor
Herbert K. Rowland
Lars H. Larsen

By *Victor J. Evans*

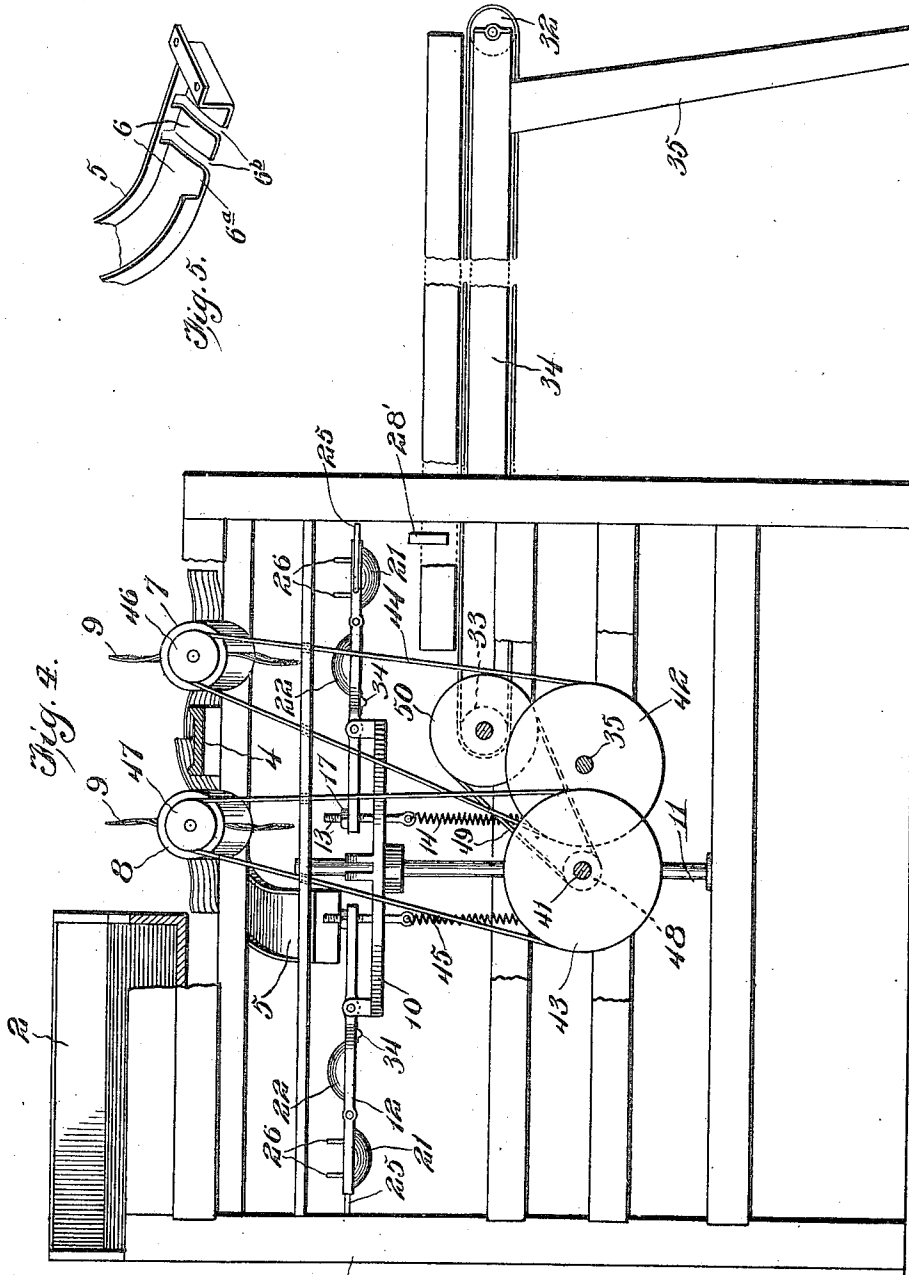
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5 SHEETS—SHEET 4.



Witnesses
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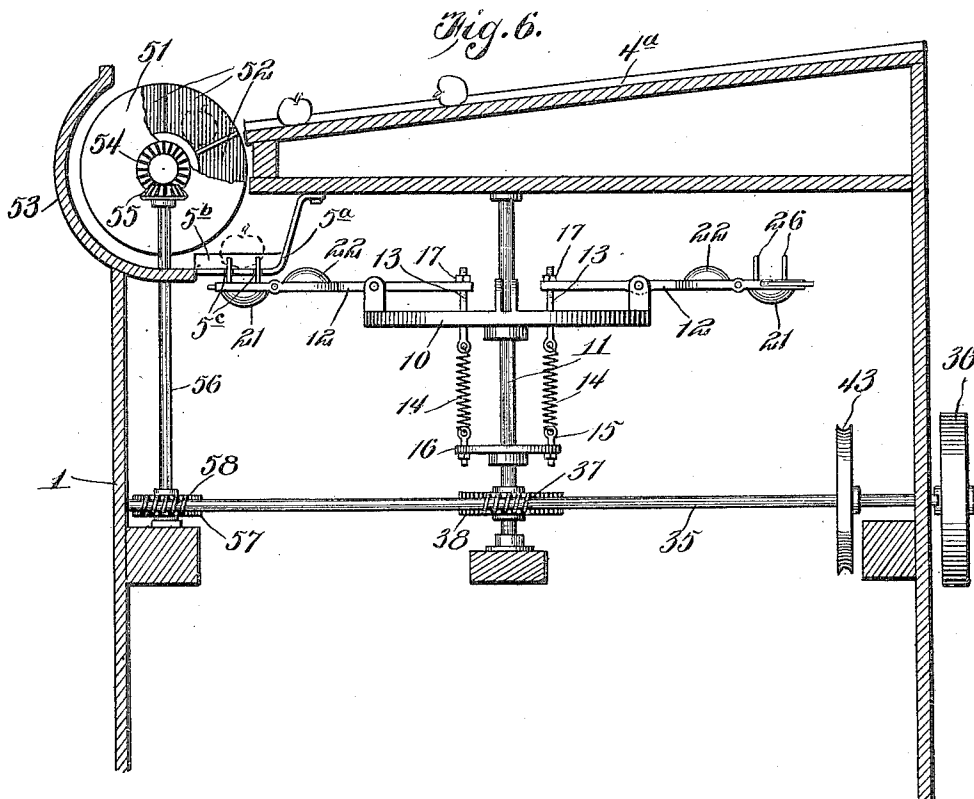
Inventors
Herbert K. Rowland
Lars H. Larsen
 By *Victor J. Evans*
 Attorney

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5 SHEETS—SHEET 5.



Witnesses

Louis R. Heinrichs
C. C. Hines

Inventors
Herbert K. Rowland
Lars H. Larsen

By Victor J. Evans
Attorney

UNITED STATES PATENT OFFICE.

HERBERT K. ROWLAND AND LARS H. LARSEN, OF TOPPENISH, WASHINGTON.

FRUIT CLEANER AND GRADER.

972,026.

Specification of Letters Patent.

Patented Oct. 4, 1910.

Application filed November 28, 1908. Serial No. 464,871.

To all whom it may concern:

Be it known that we, HERBERT K. ROWLAND and LARS H. LARSEN, citizens of the United States, residing at Toppenish, in the county of Yakima and State of Washington, have invented new and useful Improvements in Fruit Cleaners and Graders, of which the following is a specification.

This invention relates to a fruit cleaner and grader, the object of the invention being to provide a simple, effective and comparatively inexpensive construction of machine particularly designed for cleaning and grading apples, but which may also be used for cleaning and grading other fruits, which will clean the fruit without injury to its skin or impairing its keeping qualities, and which will accurately grade or sort the fruit according to size and weight.

The present invention covers certain improvements upon the structure shown in Patent No. 925,950, granted to H. C. Rowland, June 22, 1909, and upon the structure disclosed in our prior application filed May 26, 1909, No. 498,479, allowed March 31, 1910.

With the above and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a top plan view, the outer ends of the discharge channels being broken away, of a fruit cleaner and grader embodying the invention. Fig. 2 is a horizontal section of the same on line 2—2 of Fig. 3. Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 2. Fig. 4 is a side elevation with parts broken away to better disclose the construction. Fig. 5 is a detail view of the discharge end of the delivery chute. Fig. 6 is a view similar to Fig. 4 of a modified form of machine, with parts omitted.

Referring to the drawings, 1 represents a frame of suitable construction, upon the upper rear portion of which is mounted a hopper or receptacle 2 extending transversely from side to side of the machine. Into this hopper or receptacle the apples or fruit to be cleaned and graded are dumped, the bottom of the hopper being inclined at a suitable angle to cause the fruit to feed by gravity to an inclined chute or conductor 3 projecting forwardly from the lower front

corner of the hopper. The forward end of the chute or conductor terminates above the upper or receiving end of an inclined transversely arranged channeled trough or runway 4 arranged in advance of the hopper. The apples or other fruit deposited in this trough or runway 4 from the chute 3 travel by gravity down said trough or runway and discharge into a delivery chute 5 arranged at the opposite side of the frame from the chute 3 and having its free or discharge end curved downwardly and inwardly as well as rearwardly beneath the upper portion of the hopper and terminating in rear of the runway 4.

As shown, the said discharge end of chute 5 is secured at its extremity to a part of the frame and forms a horizontal floor or shelf 6 having a lateral outlet 6^a and provided with curved transverse slots 6^b. This floor or shelf is slightly concaved in cross section to hold the foremost apple of the column in the chute against discharge through the outlet until positively released by the sorting devices, as hereinafter described.

Arranged transversely of the frame above, in parallel relation to and in front and rear of the runway 4, are rotating rolls 7 and 8 mounted on shafts journaled in suitable bearings at the sides of the frame. Projecting from the periphery of each of these rolls in a radially arranged series of flexible cleaning blades, vanes or wings, 9, extending longitudinally of the roll, each blade or vane being formed of a series of narrow strips of felt, leather, fiber or other suitable material having a certain degree of softness and flexibility. In the operation of the machine one of the rolls rotates forwardly and the other rearwardly and the vanes are thereby caused to wipe in opposite directions across the top of the runway 4 and to turn over and rub across the surfaces of the apples traveling along the same, by which, during the course of travel of the apples along the runway, the entire surface of each apple will be subjected to the rubbing action and thus thoroughly cleaned. As the vanes are composed of strips of flexible material, it will be readily understood that they will yield to pass the runway, which lies in their path of movement, and will gently rub over the apples, the blades successively coming into contact with the apples in order to insure an effective removal from the apples of all adhering foreign particles. The rolls rotate

at such a degree of rapidity that sufficient centrifugal force will be produced to prevent undue flexure of the strips of the vanes and to maintain them sufficiently stiff to exert a proper degree of frictional rubbing force. The amount of rubbing force produced by reason of this peculiar construction of the vanes, while ample to cleanse the surface of each apple, is not sufficient to injure the skin of the apple or to polish the same, a feature of advantage, as the operation of polishing impairs the keeping qualities of the fruit.

The grading or sorting mechanism comprises a rotary disk or table 10 mounted to rotate in a horizontal plane upon a vertical shaft 11. The table supports a series of grading devices which extend radially therefrom equidistantly around said table, and each consisting of a pivotally mounted, vertically movable weighing beam 12 having its inner end projecting over the surface of the table and perforated for the passage of a guide rod or bolt 13 connected by a coiled balancing spring 14 with a bolt 15 secured to a head 16 fixed to the shaft below the table, the rod 13 being vertically movable to permit the weighing beam to freely tilt and being threaded at its upper end to receive a retaining nut 17 by which the beam is held in adjusted engagement therewith and whereby the rod may be adjusted to regulate the tension of the spring and its resistance to the movement of the beam to secure accuracy of action. The outer end of the beam is bifurcated or forked, and extending between the arms 18 of the fork is a bolt or rod 19 on which is pivotally mounted a tilting carrier composed of spaced bars 20 extending beyond opposite sides of the rod and carrying a pair of cups or receptacles 21 and 22 of proper form and size to receive apples of the larger size to be sorted. The cup 21 of each grading device is shown in the outer or receiving position, in which it is adapted, in the rotation of the table, to pass beneath the delivery end of the spout or chute 5, while the cup 22, which faces reversely to the cup 21, is shown in inverted position, the two cups as thus disposed being arranged in a horizontal plane. Each cup is provided on its underside with a detent 23 adapted to be engaged by and rest upon the inner end of a sliding latch 24 mounted upon the free end of one of the arms 18 connected at its outer end with a plate spring 25 which holds it projected normally in the path of the detent, whereby the sorting device is held from tilting under the weight of the apple received therein. On the arm 18 carrying the latch and spring is a pair of spaced fingers 26 adapted when the sorting device passes beneath the lower end of the chute 5 to project and move through the slots 6 and thus free the foremost apple from

the column in the chute and cause it to pass up into the cup 21.

The outer cup of each sorting or grading device passing beneath the slotted end of the chute 5 is filled with a single or individual apple in this manner, and it will be understood that the outer end of the weighing beam will be depressed to a greater or less extent against the resistance of the spring 14 according to the size and weight of the apple. The rotation of the table brings the outer filled cups of the several grading or sorting devices above the inner ends of a series of discharge channels or passages 27, 28, 29 and 30 formed by a series of parallel strips 31 extending from a point a short distance in rear of the front of the frame outwardly beyond the frame above an endless discharge conveyer or carrier 32 which closes the bottoms of the channels and upon the upper stretch of which the apples from the filled cups are supported for conveyance and discharge, according to size, through the different channels and into suitable receptacles adjacent to the outer end of said conveyer, which latter passes around suitable guide rolls 32' and 33 mounted in suitable bearings. As shown in the present instance, an extension 34 projects beyond the front of the frame to support the projecting portions of the carrier and the overlying portions of the strips 31 and is supported at its outer end by legs 35.

It will be understood that any number of the discharge channels may be employed according to the degrees to which the apples are to be graded, those shown in the present instance progressively decreasing in size from the channel 27, which receives the largest apples, to the channel 30, which receives the smallest ones. In order to provide for the deposit of the apples from the receiving cups of the sorting devices into the proper channels, the front walls of the respective channels are respectively provided with trips or abutment projections 27', 28', 29' and 30' arranged in the arc of movement of the outer ends of the springs 25 of the grading devices, which ends of the springs are extended beyond their supporting arms 18 so as to be engaged by one or the other of said trips or abutments according to the degree of depression of the weighing beam under the weight of the apple therein. The trips or abutments are disposed, as shown in Fig. 3, at different relative elevations or levels, the trip 27' being the lowest and trip 30' the highest of the series. If, therefore, the outer cup of any particular grading device contains an apple of the smallest size, said device will be tilted only to a sufficient degree to cause the spring 25 thereof to be engaged by the last trip 30', whereby said spring will be forced outward and the latch 24 retracted to allow the cup to tilt down un-

der the weight of the apple and the latter to drop on the belt within the channel 30. In a similar manner the cup would be depressed to a slightly greater extent by an apple of the next larger size and the spring would be engaged by the trip 29', to deposit the apple in the channel 29, while an apple of the next higher grade in weight would depress the cup still further and cause the spring to be engaged by the trip 28', while an apple of the greatest size and weight within the capacity of the machine would depress the cup to an extent to bring the spring into engagement with the trip 27', whereby the apple would be deposited in the largest channel 27. Thus it will be understood that in the course of rotation of the table the grading devices pass first over the channel 27 and finally over the channel 30, and that, consequently, each weighing beam will pass over the trips coöperating with the channels adapted to receive larger apples than those contained therein and will be released by the trips associated with the particular channels adapted for the reception of apples of the size carried. After the tilting lever 20 has been tilted to discharge the apple from the cup 21, the cup 22 will be thrown into position to take the place of the cup 21 and its detent 23 will engage the retracted latch 24, whereby the positions of the cups will be reversed for the subsequent operation. This operation is effected through the thrust leverage of the weight of the discharging apple on the cup 21, whereby a half revolution is imparted to the lever and the cups carried thereby.

A light leaf spring 34 is mounted on the beam in the path of movement of the upwardly swinging retracted cup, so that the cup 21, for instance, swinging back to take the position of the cup 22, will engage and pass said spring and rest thereon when in normal position, said spring acting to check the movement of the cups to prevent the detent 23 of the cup 22 from coming too forcibly into contact with the latch 24, as will be readily understood. It will thus be seen that on one rotation of the table, the cups 21 of the several grading devices will be filled and discharge their contents into the proper channels, while upon the succeeding rotation of the table the cups 22 will be filled and their contents discharged, and that the two sets of cups will, therefore, operate alternately as receptacles in the succeeding rotations of the table.

A transverse drive shaft 35 is journaled on the frame and provided at its outer end with a belt pulley 36 for operation from any suitable source of power. The inner end of this shaft carries a worm pinion 37 meshing with a worm wheel 38 on the shaft 11, whereby said shaft and the grading devices are operated. On the shaft 35 is also

a gear wheel 39 meshing with a gear wheel 40 on a countershaft 41. These shafts 35 and 41 are provided with pulleys 42 and 43 connected respectively by belts 44 and 45 with pulleys 46 and 47 on the adjacent ends of the shafts of the cleaning rolls 7 and 8, whereby the latter are driven. On the countershaft 41 is further mounted a pulley 48 which is connected by a belt 49 with a pulley 50 on one end of the shaft of the roll 33, by which said roll is rotated to drive the delivery or carrier belt 32. The parts will thus be operated in unison so as to render the operation automatic from the time the apples are deposited in the hopper 2.

In the modified form of the invention shown in Fig. 6 the construction of the grading or sorting mechanism is the same as that heretofore described, but a slightly different arrangement of gearing and a different type of means for feeding the apples to the grading mechanism is employed. As shown, the apples roll down a chute or runway 4^a into a rotary drum or feed wheel 51 having peripheral pockets 52 to receive the same. In the rotation of the drum the apples are held within the pockets by a curved guard 53, between the lower end of which and a portion of the frame is arranged a support 5^a corresponding generally in construction to the floor or shelf portion 6 of the chute 5 and provided with a similar lateral outlet 5^b and transverse slots 5^c for the passage of the fingers 26 by which the apples are forced from said support into the cups of the grading devices. The operation of the drum is properly timed by gearing to deposit an apple upon the support just before each grading device reaches the same. To this end, the shaft of the drum is provided at one end with a beveled gear 54 meshing with a pinion 55 on the upper end of a vertical shaft 56 suitably journaled on the frame and carrying at its lower end a worm wheel 57 meshing with a worm 58 on the drive shaft 35^a. As shown in this instance the drive shaft extends across the frame and the drive pulley 36 and worm 56 are arranged at the opposite ends thereof, the worm 37 for driving the worm wheel 38 of the shaft 11 of the sorting devices being arranged at the center of the shaft.

From the foregoing description, the construction and mode of operation of the cleaning and sorting apparatus will be readily understood, and it will be seen that the invention provides a machine of this character which is simple and comparatively inexpensive of construction, which will clean the apples without polishing or bruising their skins, and which will grade the apples by weight and size by the use of an effective type of weighing mechanism, thus overcoming the objections to the machine of that

type in which the apples are forced to pass through various sizes of openings, in which apples of irregular form are liable to hang and clog the operation of the machine.

5 Having thus fully described the invention, what is claimed as new, is:—

1. In an assorting apparatus, the combination of a feeder, a rotary table, a series of vertically movable weighing beams mounted
10 upon the table, fruit receptacles carried by the outer ends of the beams, spring means connected with the inner ends of the beams for supporting the same in normal position, means for releasing the fruit from the recep-
15 tacle, and means for regulating the tension of the spring.

2. In an assorting apparatus, the combination of a feeder, a vertical shaft, a rotary table carried by the shaft, a disk upon the
20 shaft below the table, radial weighing beams pivotally mounted upon the table for movement in a vertical plane, article holders mounted upon the outer ends of said beams, bolts connected with the inner ends of the
25 beams slidable vertically through the table, and spring connections between said bolts and disk for maintaining the beams in normal position, such connections including means for regulating the tension of the
30 spring.

3. In an assorting apparatus, the combination of a feeder, a series of receptacles, a rotary table, a series of radially arranged weighing beams pivotally mounted upon the
35 table for movement in a vertical plane, said

beams carrying pivoted holders movable beneath said feeder and over said receptacles, laterally sliding latches upon the beams for retaining the holders in normal position, spring contacts upon the beams connected
40 with said latches, and contact devices arranged adjacent the receptacles to engage said spring contacts, said contact devices being disposed at different levels.

4. In an assorting apparatus, the combination of a slotted feed table, a series of receptacles, a rotary carrier, vertically movable weighing beams separated by the carrier and having forked outer ends movable beneath
45 said feed table and over said receptacles; a pair of oppositely arranged and alternately reversible cups mounted upon the fork of each beam, upright projections upon the rear arms of the forks in line with the outer cups and movable through the slots in the feed
50 table to push the articles therefrom into said cups, a laterally slidable latch upon the rear arm of each fork to engage and retain the cups in normal position, a spring contact upon the rear arm of each fork for retracting the
55 latch, and contacts disposed at different levels adjacent the receptacles for engaging said spring contacts to retract the latches.

In testimony whereof we affix our signatures in presence of two witnesses.

HERBERT K. ROWLAND.
LARS H. LARSEN.

Witnesses:

HARRIET MAXWELL,
CHAS. HORNER.