Nov. 23, 1943. E. M. WAYLAND ET AL 2,335,164

FRUIT AND VEGETABLE SIZING MACHINE

Filed Oct. 22, 1941 4 Sheets-Sheet 1

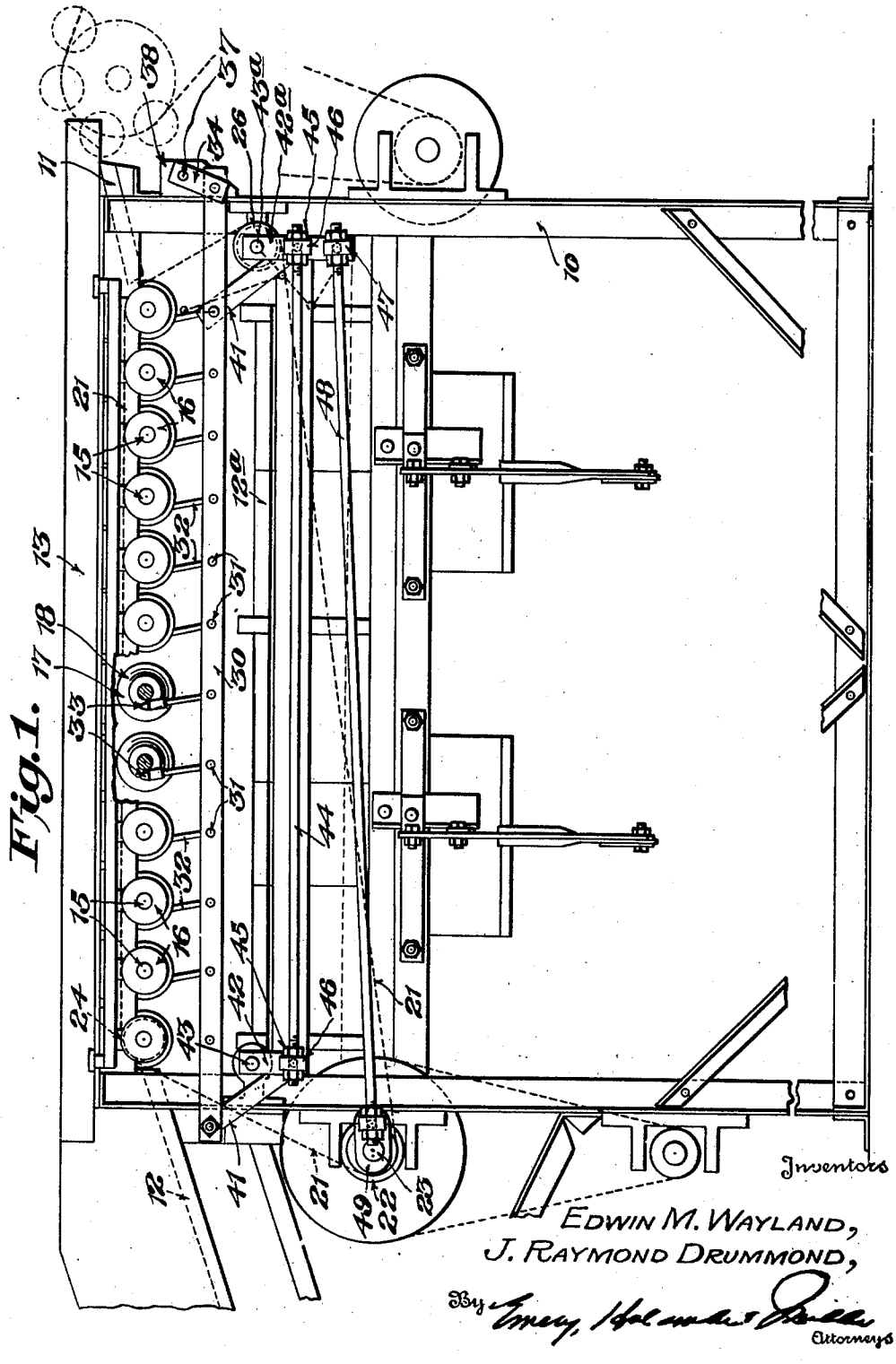

Fig. 1.

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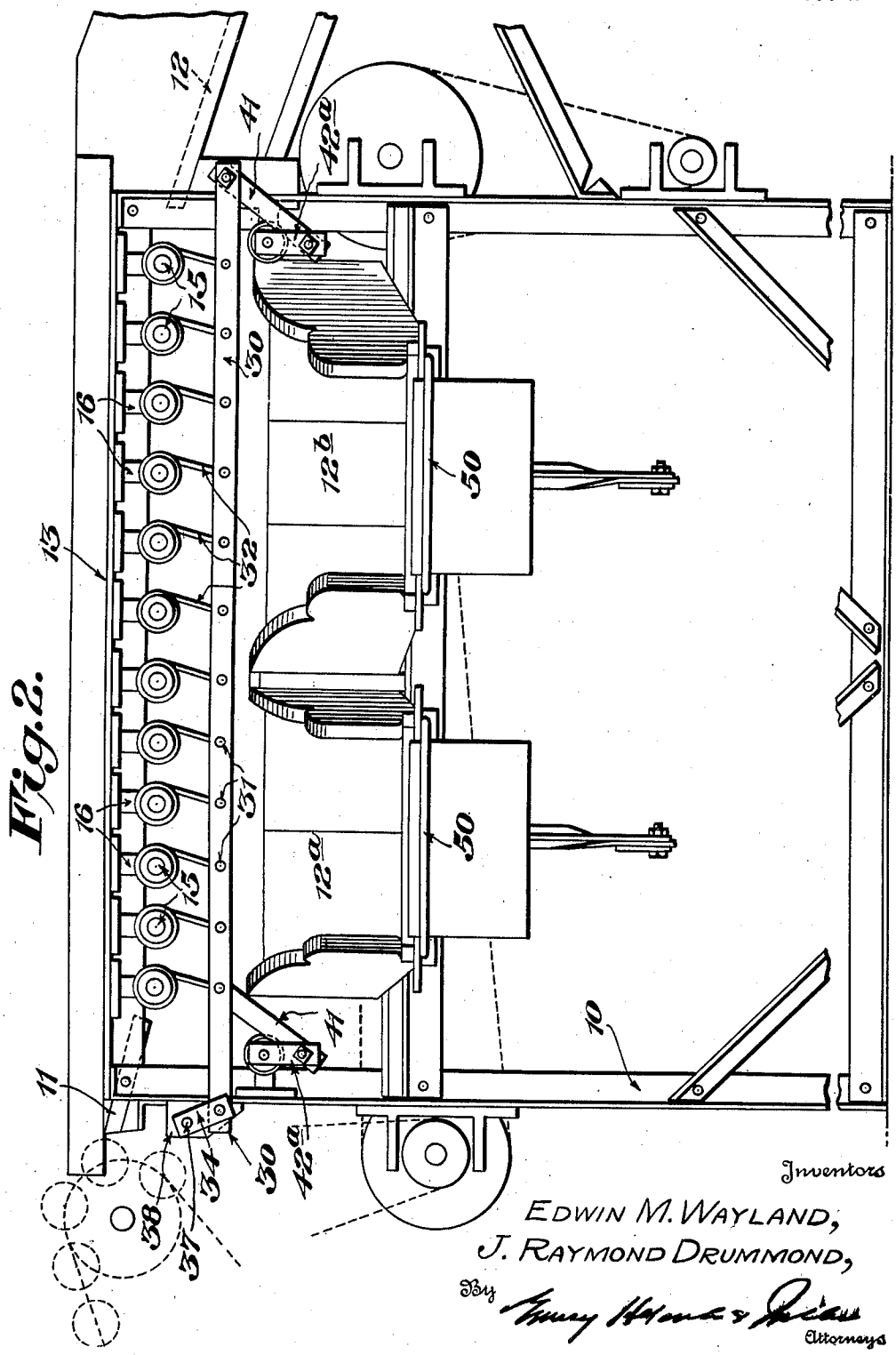

Fig. 2.

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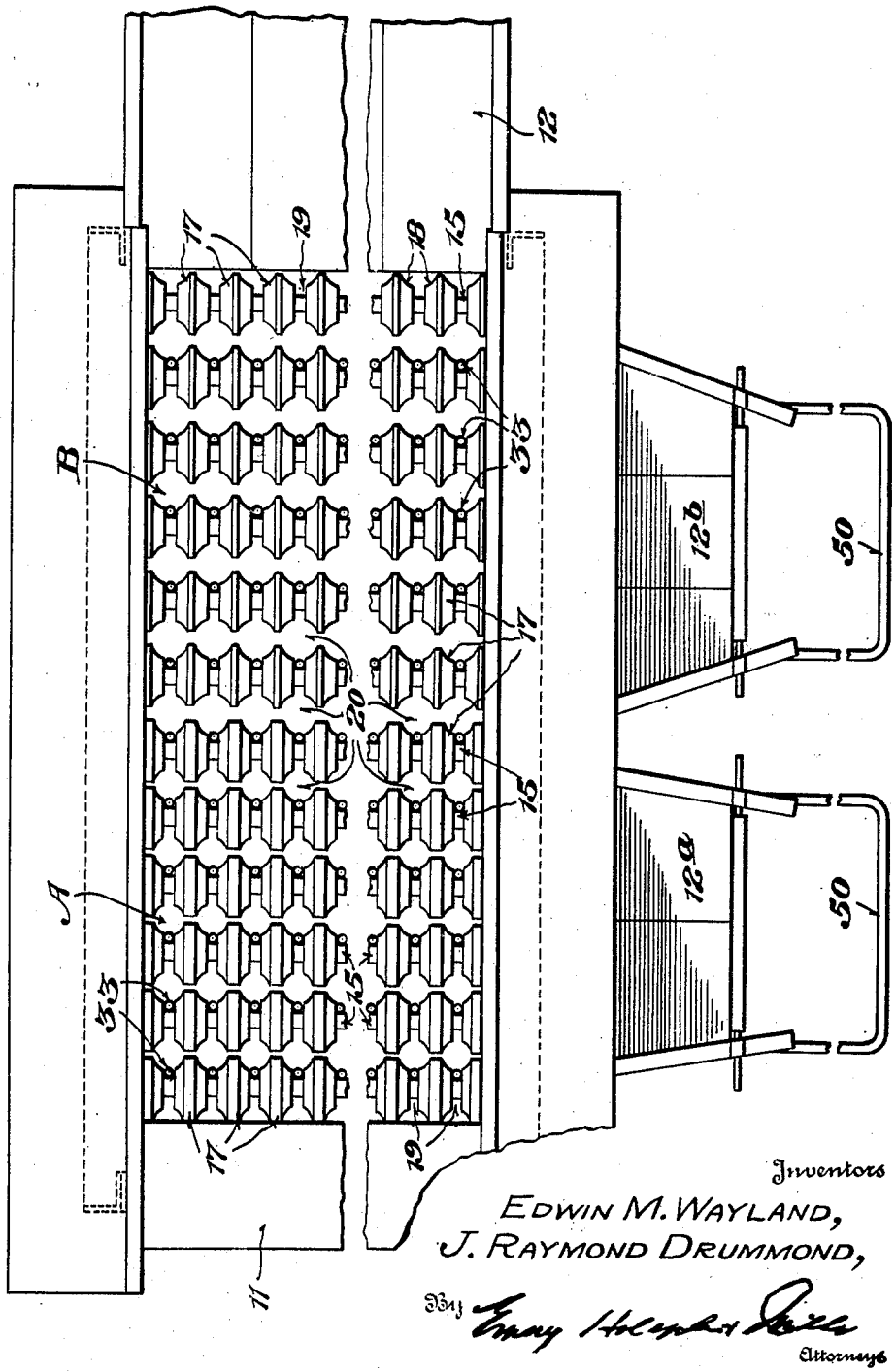
Fig. 3.



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FRUIT AND VEGETABLE SIZING MACHINE

Filed Oct. 22, 1941 4 Sheets-Sheet 4

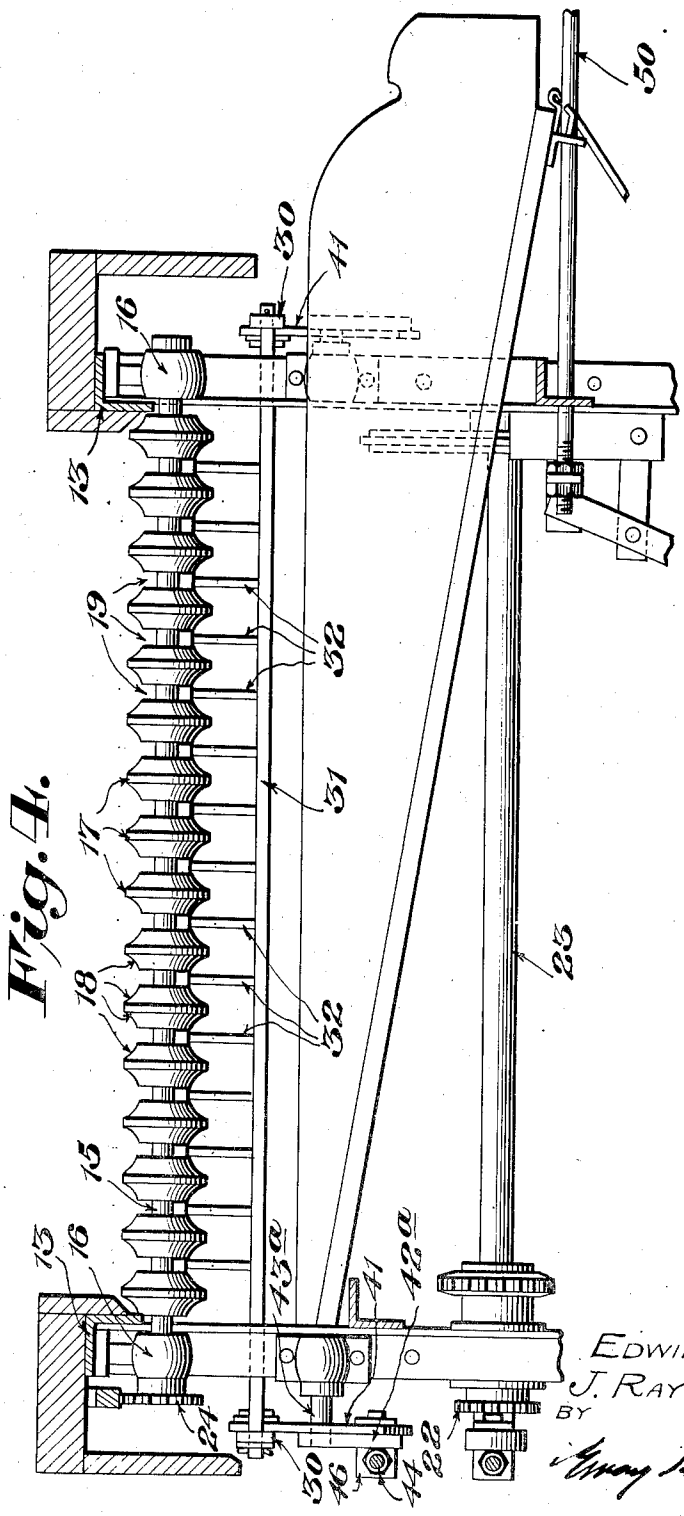

Fig. 4.

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2,335,164

UNITED STATES PATENT OFFICE

2,335,164

FRUIT AND VEGETABLE SIZING MACHINE

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Application October 22, 1941, Serial No. 416,122

5 Claims. (Cl. 209—166)

The present invention relates to sizing machines for grading fruits, vegetables and the like, as for example, potatoes and aims generally to improve existing machines for that purposes.

More particularly, the invention aims to improve the well known type of fruit and vegetable grader employing a plurality of grooved spools or rolls rotating on fixed axes and so spaced as to form between them substantially circular openings of varying size through which the sized or graded material may pass. The difficulty with such graders heretofore has been that the material, potatoes for example, barely too large to pass through the openings between the spools or rolls, tends to rotate idly between the spools and are not propelled forwardly by the rotating spools. In other words, the machines were not self-cleaning as to all sizes of material too large to pass through the openings between the spools.

We are aware that various means have heretofore been proposed for propelling the material forward over the rotating spools, but so far as I am aware, have not found practical application in potato sizing and grading machines, wherein the contour of the material graded is usually irregular.

The primary object of our invention, therefore, aims to improve generally the self-cleaning ejector or propeller means for displacing the idly rotating material in any groove between adjacent spools upwardly and forwardly toward the next succeeding groove.

More particularly, the invention aims to improve and simplify the construction of the ejector means as well as the mechanism for imparting the upward and forward movement thereto.

A further object of the invention is to improve the construction of the grading rolls or spools so that the ejector means may be positioned in between them without in any way reducing the size opening between adjacent spools through which the graded material passes.

The nature of the invention is best understood by reference to the following detailed description of one preferred embodiment thereof, reference being had to the accompanying drawings for illustrative purposes.

Fig. 1 is a side elevation of a machine embodying the invention, parts being broken away to more clearly illustrate the construction;

Fig. 2 is a side elevation as viewed from the opposite side of the machine;

Fig. 3 is a plan view of the machine; and

Fig. 4 is a transverse sectional view of the machine.

According to the preferred embodiment of the invention, the machine comprises a suitable supporting framework 10, providing a material-receiving board 11 and a delivery board 12 connected by upper side rails 13. The upper surface of the machine intermediate the receiving and delivery boards 11—12 constitutes a grading table advantageously of the roller type, the rolls of which rotate on fixed axes.

The grading table advantageously comprises a plurality of transversely extending shafts 15 mounted in bearings 16 depending from the side rails 13 and carrying a plurality of spaced spools 17 having opposed concaved tapering faces 18. The spools 17 may be of any suitable material, preferably rubber, and are suitably fixed to the shaft 15, as by pinning, to provide spaces or radial elongations 19 therebetween. The shape of the concaved tapering faces 18 is such that the adjacent faces of four spools combined with the intermediate spaces 19 and the spaces between spools on adjacent shafts will provide substantially circular grading openings 20 of desired size. Advantageously the grading table comprises two or more grading sections A and B (see Fig. 3), effected by the proper spacing between the shafts 15 and the diameter of the spools 17 to provide for grading a plurality of sizes of fruit or like material.

The shafts 15 may be driven in unison and in a uniform direction by any suitable means, as for example by means of an endless chain 21 trained over a sprocket 22 on a driven shaft 23, thence over sprockets on each of the shafts 15 and finally on an idler sprocket 26.

In the operation of fruit grading machines of the roller type, there is a tendency for certain fruit or material, slightly too large to pass through the openings 20, but smaller than the maximum diameter of the spools, to rotate idly against the concaved fans, such as at 18. In other words, the machines are not self-cleaning for all kinds of material and this is particularly true in the case of grading and sizing potatoes.

Our invention provides a simple, novel and efficient ejector or propelling mechanism capable of clearing the idly rotating material from the openings 20, the ejector or propelling means being normally positioned so as not to restrict the size of the openings or prevent graded material from falling through, yet movable upwardly and forwardly across said openings to project

the idly rotating material upwardly and forwardly over the next succeeding pair of spools.

The ejector or propelling means above referred to, advantageously comprises a vertically swinging frame 30 on opposite sides of the machine, in which are fixedly mounted the ends of a plurality of transversely extending propeller frames. Each propeller frame 30 comprises a cross bar 31 fixedly mounted in the side frame 30 and a plurality of upstanding propeller rods or tines 32, there being one rod 32 for each opening 20. The mounting of the rods 32 is such that in normal position the ends of the rods 32 lie within the spaces 19 between adjacent spools 17, so that the rods do not restrict the size of the openings 20 against the passage of material therethrough. The upper ends of the rods may, if desired, be covered by rubber tips 33, though this is not necessary.

Vertical swinging movement of the frame 30 may be effected by any desired mechanism, that illustrated herein being simple and efficient for the purpose.

As herein illustrated (see Fig. 1), one end of the frame is pivotally connected to a link 34, pivoted at 37 to a bracket 38, so as to control movement of the frame 30 forwardly and upwardly. A pair of parallel disposed links 41 are pivotally connected at one end to the frame 30 and at the opposite ends to depending arms 42—42a of cranks 43—43a located at opposite ends of the machine. The depending arms 42—42a are interconnected by a pitman 44 having adjustable threaded connections 45 with heads 46 swivelly connected to the arms 42—42a, so that the arms and links 41 move in unison. The depending arm 42a may be longer than the arm 42 (see Fig. 1) to receive at its lower end a swivelly connected head 47 in which is threadedly adjusted one end of a pitman 48, the other end of which is swivelly connected to a crank 49 on the driven shaft 23. As the crank 49 rotates one half revolution (see Fig. 1), the depending arms 42—42a are oscillated in unison, through interconnecting pitmans, to raise links 41 and frame 30, the movements of the latter being confined to a parallel plane as stated above. Obviously adjustment of the pitmans to the heads at their ends varies the position of the propeller rods 32 vertically with respect to the spools.

It will be noted that the vertical swinging movement of the frame 30 and the propeller rods 32 is controlled directly by the rotation of the crank 49 on shaft 23, which also controls the rotation of the spools. Advantageously the sprocket 22 on the shaft 23 is approximately of the same number of teeth as sprockets 24 on shafts 15, so that the rods 32 may have one cycle of movement for each complete rotation of the spools. Thus the capacity of the machine is maintained at a maximum.

Advantageously the machine may also be provided with side delivery boards 12a and 12b mounted across the machine below the frame 30 so as to receive the material graded through the openings 20. These delivery boards together with the board 12 are preferably downwardly inclined to convey sized material to suitable bags or receptacles suspended from bag holders 50, which may be of any conventional design.

In the operation of the machine the shaft 23 may be driven by any suitable source of power, as for example by means of a chain and sprocket device 51 (see Fig. 1), which effects rotation of the shafts 15 and the spools 17 through means of chain 21. The material to be graded, for example potatoes, is fed to the grading table over the receiving board 11 onto the rotating spools. The smaller material passes through the openings 20 of section A onto the delivery board 12a; the second size material passes through the larger openings 20 of section B onto the delivery board 12b, while the largest sizes are carried over the grading table and discharged onto the delivery board 12.

Much of the material to be graded has a tendency to rotate idly between the concaved faces of the spools, and this is particularly true of potatoes, which are of irregular shape and are not always spherical in shape. Often a smaller end will extend downwardly through a grading opening 20 but the opposite end will be too large to permit the potato to pass through the opening.

Such idly rotating material will be dislodged from the groove between the spools at regular intervals due to the periodic raising of the frame 30 and its associated propeller rods 32 as controlled by the crank 49. The movement of these rods 32 is in an arcuate path, upwardly and forwardly, as above described, which propels the potatoes over the succeeding spools with the attendant result that the material moves progressively over the grading table and the machine is rendered self-clearing.

While we have adopted for illustrative purposes a machine for sizing and grading potatoes, it is to be understood that the invention is not to be so restricted and is adaptable to the sizing and grading of other fruits, vegetables and materials.

We claim:

1. A machine for grading and sizing fruits, vegetables and the like comprising a grading table having a series of spaced transversely extending rotary shafts, a plurality of spools fixed to said shafts in spaced relation thereon defining grading openings of predetermined size and communicating propeller rod-receiving spaces between adjacent spools on a shaft, a vertically movable frame below said grading table, a plurality of transverse rods rigidly mounted in said frame, a plurality of upstanding propellers connected to said transverse rods, and having their upper ends normally disposed substantially in the plane of the grading openings, and means for periodically moving said frame upwardly and forwardly to project said propeller rods across said grading openings.

2. A machine for grading and sizing fruits, vegetables and the like comprising a grading table having a series of spaced transversely extending rotary shafts, a plurality of spools fixed to said shafts in spaced relation thereon defining grading openings of predetermined size and communicating propeller rod receiving spaces between adjacent spools on a shaft, a vertically movable frame below said grading table, a plurality of upstanding propellers connected to said transverse rods, and having their upper ends normally disposed substantially in the plane of the grading openings, and means for periodically moving said frame upwardly and forwardly to project said propeller rods upwardly and forwardly between adjacent spaces.

3. A machine for grading and sizing fruits, vegetables and the like comprising a grading table having a series of spaced transversely extending rotary shafts, a plurality of spools fixed to said shafts in spaced relation thereon defining grading openings of predetermined size and communicating propeller rod receiving spaces

between adjacent spools on a shaft, a vertically movable frame below said grading table, a plurality of transverse rods rigidly mounted in said frame, a plurality of upstanding propellers connected to said transverse rods, and having their upper ends normally disposed substantially in the plane of the grading openings, and means for periodically moving said frame upwardly and forwardly to project said propeller rods in a convexed arcuate path across said grading openings.

4. A machine for grading fruits, vegetables and the like comprising a framework providing a receiving table, a delivery table and a live roll conveying and grading table between said receiving and delivery tables, said grading table including a plurality of spaced rotary shafts, a plurality of resilient spools mounted on said shafts in spaced apart relation, said spools being formed with opposed tapering concaved faces cooperating to provide substantially circular concaved opening and communicating radial elongations thereof, ejector means individual to each grading opening having their upper ends normally disposed in said radial elongations and in the plane of said grading openings and means for periodically operating said ejector means to move them upwardly and forwardly across said grading openings to displace idly rotating material therefrom.

5, A machine for grading fruits, vegetables and the like comprising a framework providing a receiving table, a delivery table and a grading and conveying table between said receiving and delivery tables, said grading table including a plurality of live rolls each having a plurality of peripheral grooves with radial elongations substantially centrally of the grooves, said grooves of adjacent rolls cooperating to provide substantially circular grading openings with communicating radial elongations, ejector means individual to each grading opening having their upper ends normally disposed in said radial elongations and in the plane of said grading openings and means for periodically operating said ejector means to move them upwardly and forwardly across said grading openings to displace idly rotating material therefrom.

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