June 16, 1942. J. THOMAS 2,286,393

VEGETABLE CLEANER

Filed June 6, 1938

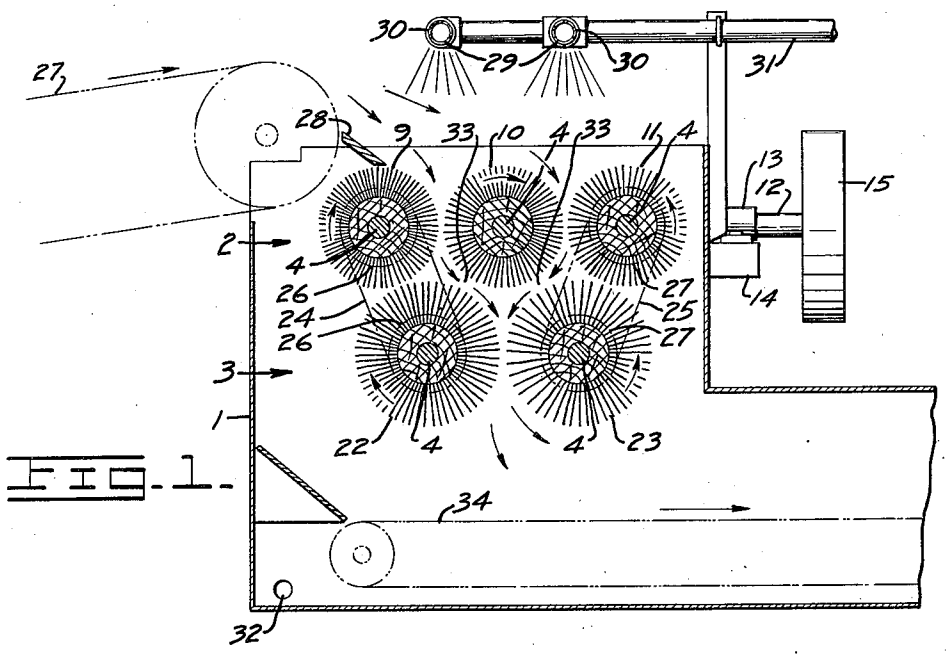


FIG. 1.

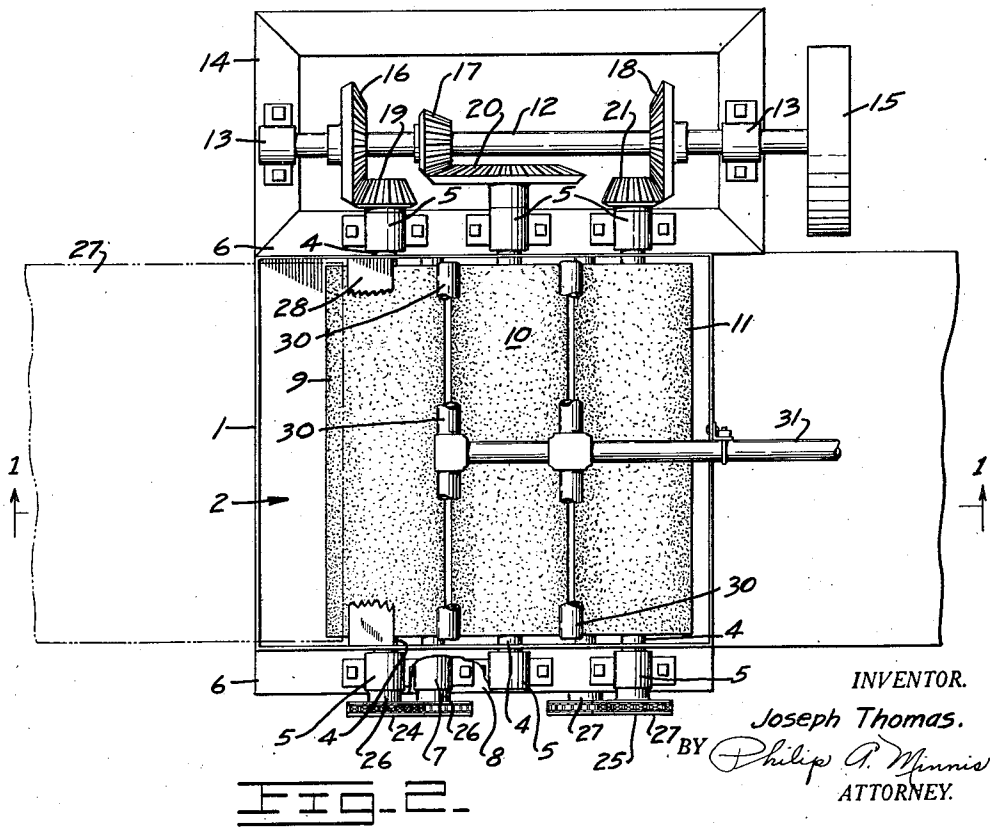


FIG. 2.

INVENTOR.
Joseph Thomas.
Philip A. Minnis
ATTORNEY.

Patented June 16, 1942 2,286,393

UNITED STATES PATENT OFFICE

2,286,393

VEGETABLE CLEANER

Joseph Thomas, Walnut Grove, Calif., assignor to Food Machinery Corporation, San Jose, Calif., a corporation of Delaware

Application June 6, 1938, Serial No. 212,053

24 Claims. (Cl. 146—202)

This invention relates to vegetable cleaning apparatus, and, although susceptible of more or less general application to a wide variety of products, is especially well suited for cleaning asparagus, and hence, for purposes of this disclosure, will be described as it may be used in that connection.

As is well known, the cleaning of asparagus for commercial purposes presents a particularly difficult problem by reason of the tenderness of the stalks which necessitates careful handling to avoid injury, and such methods of cleaning as have heretofore been employed are generally ineffective to accomplish thorough cleaning, as well as being slow and unsuited to modern production requirements.

It is the general object of the present invention to provide a vegetable cleaning machine which is capable of effecting a thorough cleaning of the vegetables without injuriously rough treatment thereof.

A more specific object is to provide a machine which is well adapted for cleaning asparagus effectively and without injury thereto.

Another object is to provide a vegetable cleaning machine of the character referred to, which is continuous in operation, has a large capacity, and is of simple and inexpensive construction.

Further objects and advantages will best be understood from the following description of an illustrative embodiment taken in connection with the accompanying drawing thereof, in which:

Fig. 1 is a longitudinal sectional elevation of a machine embodying the invention, as viewed along the line 1—1 of Fig. 2.

Fig. 2 is a plan view of the machine.

In the drawing, the reference character 1 indicates an open topped tank within the upper portion of which are mounted two sets of parallel, transversely extending cylindrical brush rolls, namely, an upper set generally indicated at 2 and a lower set generally indicated at 3. Preferably, for cleaning asparagus, the brush bristles are formed of horse hair or other similarly soft material, although for cleaning other products, bristles of greater or lesser stiffness may be used according to the nature and requirements of the particular product to be cleaned. All of the brushes are rotatably mounted by means of the brush shafts 4 which project through the side walls of the tank, the upper brush shafts being journalled in bearings 5 carried by side rails 6 secured to the outside of the tank, and the lower brush shafts being journalled in bearings 7 carried by side rails 8 extending parallel to and beneath the rails 6.

The brushes of the upper set, indicated at 9, 10 and 11 respectively, are arranged with their peripheries in closely adjacent relation, and are driven from a drive shaft 12 journalled in bearings 13 carried by a supporting framework 14 mounted to one side of the tank 1. The drive shaft 12 is provided with a pulley 15 which may be driven from any suitable source of power, and carries a series of bevel gears 16, 17 and 18 which intermesh respectively with corresponding bevel gears 19, 20 and 21 secured to the outer ends of the upper brush shafts.

The brushes 22 and 23 of the lower set are arranged beneath the valleys formed between the brushes of the upper set and are driven by chains 24 and 25 respectively. The chain 24 is trained around a pair of sprockets 26 carried respectively by the shaft of the upper brush 9 and lower brush 22. The chain 25 is trained around the sprockets 27 carried by the shafts of the upper brush 11 and lower brush 23.

It is to be observed that the ratios and arrangement of the associated pairs of bevel gears 16—19, 17—20, and 18—21 are such that the first two brushes 9 and 10 of the upper set are driven in a clockwise direction as viewed in Fig. 1, but that the brush 10 is driven at a slower speed than the brush 9. The final brush 11 is driven in an anticlockwise direction, and preferably at a higher rate of speed than the middle brush 10. The two brushes 22 and 23 of the lower set are driven in opposite directions so that their upper peripheries move towards each other, and may be driven at the same speeds. I have found that with upper brushes of 5" diameter each and lower brushes of 6" diameter each, rotative speeds of 400 R. P. M., 70 R. P. M., and 400 R. P. M., respectively for the upper brushes 9, 10 and 11, and 400 R. P. M. for each of the lower brushes, gives satisfactory results for cleaning asparagus, but it is to be understood that these particular speeds are given as illustrative examples only and may be varied according to preference, conditions of operation, or to suit the requirements of the particular product to be cleaned.

In operation, the asparagus to be cleaned is indiscriminately spread, although preferably not too deeply, upon the feed conveyor 27, which discharges it over the ramp 28 into the valley between the rotating brushes 9 and 10. Here the asparagus receives a gentle but effective scrubbing and at the same time is washed by sprays of water discharged from a series of slots 29 in

one of the spray pipes 30 which extend above the valleys between the brushes. Water may be supplied to the spray pipes from any suitable source through the header 31. The wash water is collected in the lower part of the tank 1 provided with an outlet 32 from which the water may be discharged to the sewer, or if desired, pumped back to the spray pipes for re-use.

It will be apparent that although the first two brushes 9 and 10 are driven in a common direction of rotation, the speed differential between them causes the asparagus in the bottom of the valley to be urged downwardly between the brushes, due to the greater speed of the downwardly travelling periphery of the brush 9 than that of the adjacent upwardly travelling periphery of the brush 10 and the length of the bristles relative to the size of the asparagus is such as to permit the product to be positively discharged downwardly through the valley. On the other hand, if the asparagus is delivered in sufficient quantities, it will not only pile up in the valley between the brushes to a certain extent depending upon the rate of feed, but many of the stalks will inevitably be deposited crosswise of the brushes, and the common direction of rotation of the brushes causes these crosswise stalks, together with those piled on top of them and those which by reason of their position in the pile are more greatly affected by the brush 10 than the brush 9, to advance over the crest of the brush 10 into the next succeeding valley. The result is that in operation a portion of the asparagus delivered into the valley between the first two brushes is positively discharged downwardly between the brushes while the rest advances over the middle brush into the next valley.

The asparagus reaching the valley between the brushes 10 and 11 is however subjected to the action of oppositely rotating brushes, and the brush 11 not only opposes further advance of the asparagus, but does so with greater force than the brush 10 tends to advance it, due to its higher rate of speed. Moreover, the downwardly moving adjacent peripheries of the brushes cooperate to urge the asparagus downwardly between them, with the result that all of the asparagus delivered into the valley between the rolls 10 and 11 is positively discharged downwardly between them.

The stalks of asparagus discharged downwardly between the brush rolls of the upper set fall upon the upper surfaces of the oppositely rotating pair of lower brushes as will be apparent, and is moved by these latter brushes into the valley between them where it receives further brushing. The staggered relation of the lower brushes with respect to the upper ones permits them to be mounted as illustrated for cooperation with the upper intermediate brush to form passageways 33, through which the asparagus passes in brushing engagement with the adjacent faces of the rolls forming the passageways. This arrangement provides added brushing action and also causes a slight bending action on the stalks as they pass into and out of the passageways which increases the brushing action on the stalks as they pass to the valley between the lower brushes. From the latter valley the asparagus is discharged downwardly under the action of the adjacent downwardly moving brush peripheries.

As heretofore pointed out, these lower brushes are somewhat larger than those of the upper set so that although they are set closely together, their axes are offset from beneath the valleys between the upper brushes. With this arrangement, the asparagus does not fall directly upon the crests of the lower brushes, but slightly over toward the valley between them, which insures a proper and positive feed to the latter valley. Moreover, the paths from the valleys between the upper brushes to the valley between the lower ones makes a less abrubt turn than would be the case if smaller brushes were used, thereby minimizing danger of bending the stalks to the point of breaking them as they are transferred from the upper valleys to the lower one.

The asparagus discharged from the lower brushes may be received upon an endless conveyor 34 which carries it out of the tank to any suitable point of discharge.

It will be seen that the asparagus receives a thorough brushing during its passage through the machine, first by the upper brushes, again as it passes between the upper middle brush and the cooperating faces of the lower brushes, and finally by the lower brushes as it passes into and downwardly through the valley between them. During the brushing treatment it is also thoroughly washed so that it is effectively cleaned by the time it reaches the discharge conveyor.

It may be observed that although, in the particular embodiment selected for illustration, the upper set of brushes employs three brushes, and the lower set two, a greater or lesser number may be employed if desired. For example, additional brushes such as 9 and 10 might be placed ahead of them and additional sets of lower brushes be arranged to cooperate therewith. Or, if a smaller machine or less brushing be desired, the brush 9 may be dispensed with, or both the brush 9 and 22 be eliminated. Obviously, if only the brush 9 is omitted the machine will have less capacity but the asparagus will receive substantially the same amount of treatment. On the other hand, if both the brushes 9 and 22 be omitted, the capacity of the machine will not only be reduced but the asparagus will receive somewhat less treatments.

Modifications such as just referred to may be desirable for certain conditions or purposes, and it will be understood that these and other variations in arrangement as well as various modifications and alterations in structure may be made without in any way departing from the spirit or scope of my invention. Moreover, it will also be understood that although I have described the invention as it may be used in connection with the cleaning of asparagus, it may likewise be used for cleaning other vegetables or articles as well, and I deem myself entitled to all such uses, arrangements, modifications and alterations.

I claim:

1. In a vegetable cleaning machine, a series of brush rolls made up of a plurality of initial rolls and a terminal roll, means mounting said brush rolls in adjacent parallel relation to form a brushing bed over which vegetables may be advanced transversely of the rolls, means for driving the initial rolls in a common direction of rotation corresponding to the direction of advance of said vegetables, and means for driving the terminal roll in a direction of rotation opposite the others to arrest the advance of the vegetables, the spacing of the terminal roll and the oppositely rotating adjacent roll and the ratio of their speed of rotation being such that the vegetables resting on said terminal roll and the oppo-

sitely rotating adjacent roll are discharged downwardly therebetween and in brushing engagement therewith.

2. In a vegetable cleaning machine, a series of brush rolls made up of a plurality of initial rolls and a terminal roll, means mounting said brush rolls in adjacent parallel relation to form a brushing bed over which vegetables may be advanced transversely of the rolls, means for driving the initial rolls in a common direction of rotation corresponding to the direction of advance of said vegetables, and means for driving the terminal roll in a direction of rotation opposite the others and at a greater peripheral speed than the immediately preceding roll whereby to arrest the advance of the vegetables the spacing of the terminal roll and the oppositely rotating adjacent roll and the ratio of their speed of rotation being such that the vegetables resting on said terminal roll and the oppositely rotating adjacent roll are discharged downwardly therebetween and in brushing engagement therewith.

3. In a vegetable cleaning machine, a series of brush rolls made up of a plurality of initial rolls and a terminal roll, said brush rolls being arranged in adjacent parallel and spaced relation to form a brushing bed over which vegetables may be advanced transversely of the rolls, means for driving the initial rolls in a common direction of rotation corresponding to the direction of advance of said vegetables and at progressively slower speeds the spacing of the initial rolls and the ratio of their speed of rotation being such that a portion of the vegetables passing thereover are discharged downwardly therebetween, and means for driving the terminal roll in a direction opposite the others to arrest further advance of the vegetables and to discharge the same downwardly between said terminal roll and the oppositely rotating adjacent roll.

4. In a vegetable cleaning machine, a series of brush rolls made up of a plurality of initial rolls and a terminal roll, means mounting said brush rolls in adjacent parallel and spaced relation to form a brushing bed over which vegetables may be advanced transversely of the rolls, means for driving the initial rolls in a common direction corresponding to the direction of advance of said vegetables and at progressively slower speeds, the spacing and ratio of the speed of rotation of the rolls being such that a portion of the vegetables passing thereover are discharged downwardly therebetween, and means for driving the terminal roll in a direction opposite the others and at a greater peripheral speed than the immediately preceding roll whereby to arrest further advance of the vegetables and to discharge the same downwardly between said terminal roll and the oppositely rotating adjacent roll.

5. In a vegetable cleaning machine, a pair of brush rolls arranged in closely spaced parallel relation to form a brushing bed over which vegetables may be advanced transversely of the rolls, means for driving said rolls to effect the discharge of vegetables downwardly from the valley formed therebetween, a second pair of brush rolls mounted in spaced relation beneath and parallel to said upper rolls to receive therebetween vegetables discharged downwardly from said upper rolls, and means for driving said lower rolls in opposite directions to effect the discharge of vegetables downwardly from the valley formed therebetween.

6. In a vegetable cleaning machine, two pairs of brush rolls, each pair of rolls being arranged in spaced parallel relation to form a vegetable receiving valley therebetween and one of said pairs of rolls being mounted beneath and in spaced and staggered relation to the other pair whereby vegetables passing downwardly from the valley formed between the upper pair of rolls are received upon the upper surface of one of said lower pair of rolls, and means for driving each pair of rolls to effect the discharge of vegetables downwardly therebetween, said vegetable receiving roll of the lower pair being driven in a direction to cause its upper surface to move toward said lower valley and being mounted for cooperation with one of said upper rolls to form a brushing passageway through which the vegetables pass in brushing engagement with the faces of the rolls forming said passageway as said vegetables pass into the valley between the lower rolls.

7. In a vegetable cleaning machine, two pairs of brush rolls, each pair of rolls being arranged in spaced parallel relation to form a vegetable receiving valley therebetween, the rolls of one of said pairs being larger than those of the other pair and being mounted beneath and in staggered relation thereto whereby vegetables passing downwardly from the valley formed between the upper pair of rolls are received upon the upper surface of one of said lower pair of rolls to the side of its crest adjacent the valley between said lower rolls, and means for driving each pair of rolls to effect the discharge of vegetables downwardly therebetween, said vegetable receiving roll of the lower pair being driven in a direction to cause its upper surface to move toward said lower valley and being mounted for cooperation with one of said upper rolls to form a brushing passageway between said upper roll and the vegetable receiving side of said lower roll through which the vegetables pass in brushing engagement with the faces of the rolls forming said passageway as said vegetables pass into the valley between the lower rolls.

8. In a vegetable cleaning machine, a set of three brush rolls arranged in axially spaced parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, and a second set of two brush rolls also arranged in axially spaced parallel relation to form a vegetable receiving valley therebetween, the rolls of said second set being mounted beneath the valleys formed between the rolls of the upper set whereby vegetables passing downwardly through said upper valleys are received upon the upper faces of the lower rolls, and means for driving said lower rolls in opposite directions for discharging vegetables received thereby between the same and in brushing contact therewith.

9. In a vegetable cleaning machine, a set of three brush rolls arranged in axially spaced parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, means for differentially driving said rolls in a common direction to discharge vegetables downwardly therebetween, and a second set of two brush rolls also arranged in axially spaced parallel relation to form a vegetable receiving valley therebetween, the rolls of said second set being mounted beneath the valleys formed between the rolls of the upper set whereby vegetables passing downwardly through

said upper valleys are received upon the upper faces of the lower rolls, and means for driving the second set of rolls in opposite directions for discharging the vegetables received thereby downwardly between the same and in brushing contact therewith.

10. In a vegetable cleaning machine, a set of three brush rolls arranged in spaced parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, means for driving two of said rolls in a common direction corresponding to the direction of advance of said vegetables and at progressively slower speeds whereby a portion of the vegetables are discharged downwardly therebetween, means for driving the third roll in a direction opposite the others to arrest further advance of the vegetables and to discharge the same downwardly between said third roll and the oppositely rotating adjacent roll, and a second set of two brush rolls also arranged in spaced parallel relation to form a vegetable receiving valley therebetween, the rolls of said second set being mounted beneath the valleys formed between the rolls of the upper set whereby vegetables passing downwardly through said upper valleys are received upon the upper faces of the lower rolls.

11. In a vegetable cleaning machine, a set of three brush rolls arranged in spaced parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, means for driving said rolls to discharge vegetables downwardly therebetween, a second set of two brush rolls also arranged in spaced parallel relation to form a vegetable receiving valley therebetween, means mounting the rolls of said second set beneath the valleys formed between the rolls of the upper set for receiving vegetables passing downwardly through said upper valleys upon the upper faces of the lower rolls, and means for driving said lower rolls in opposite directions for discharging vegetables downwardly therebetween.

12. In a vegetable cleaning machine, a set of three brush rolls arranged in axially spaced parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, and a second set of two brush rolls also arranged in axially spaced parallel relation to form a vegetable receiving valley therebetween, the rolls of said second set being mounted beneath the valleys formed between the rolls of the upper set whereby vegetables passing downwardly through said upper valleys are received upon the upper faces of the lower rolls, the rolls of said lower set cooperating with the intermediate roll of the upper set to form brushing passageways through which the vegetables are directed in brushing engagement with the faces of the rolls forming said passageways as said vegetables pass into the valley between the lower rolls, and means for rotating said second set of rolls in opposite directions for discharging the vegetables received thereby downwardly between the same and in brushing contact therewith.

13. In a vegetable cleaning machine, a set of three brush rolls arranged in spaced and parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, and a second set of two brush rolls also arranged in spaced and parallel relation to form a vegetable receiving valley therebetween, the rolls of said second set being larger than those of the other set and being mounted beneath the valleys formed between the rolls of the upper set whereby vegetables passing downwardly through said upper valleys are received upon the upper faces of the lower rolls to the sides of their crests adjacent the valley between them, the rolls of said lower set cooperating with the intermediate roll of the upper set to form brushing passageways through which the vegetables are directed in brushing engagement with the faces of the rolls forming said passageways as said vegetables pass into the valley between the lower rolls, and means for rotating the lower rolls in opposite directions for discharging the vegetables therebetween.

14. In a vegetable cleaning machine, a set of three brush rolls arranged in spaced and parallel relation to form vegetable receiving valleys therebetween from one to the other of which valleys vegetables may be advanced transversely of the intervening roll, means for driving two of said rolls in a common direction corresponding to the direction of advance of said vegetables and at progressively slower speeds whereby a portion of the vegetables are discharged downwardly therebetween, means for driving the third roll in a direction opposite the others to arrest further advance of the vegetables and to discharge the same downwardly between said third roll and the oppositely rotating adjacent roll, a second set of two brush rolls also arranged in spaced and parallel relation to form a vegetable receiving valley therebetween, and means for driving said second set of rolls to move their upper surfaces toward the valley therebetween, means mounting the rolls of said second set beneath the valleys formed between the rolls of the upper set whereby vegetables passing downwardly through said upper valleys are received upon the upper faces of the lower rolls to the sides of their crests adjacent the valley between them, the rolls of said lower set cooperating with the intermediate roll of the upper set to form brushing passageways through which the vegetables are directed in brushing engagement with the faces of the rolls forming said passageways as said vegetables pass into the valley between the lower rolls.

15. In a vegetable cleaning machine, an upper pair of parallel brush rolls arranged transversely to the flow of vegetables thereover, means for driving said rolls in a common direction of rotation, said rolls being mounted in such axially spaced relation as to support a part of said vegetables therebetween for advancement across the rolls while permitting others of said vegetables to pass downwardly therebetween and in brushing engagement with adjacent surfaces of the rolls, and a third parallel brush roll mounted beneath the valley formed between said upper pair of rolls to receive upon its upper surface the vegetables passing downwardly between said upper rolls and arranged to direct said vegetables over a path between and in brushing engagement with adjacent faces of said lower roll and one of said upper rolls, said path being uninterrupted to permit said vegetables to be discharged from between the adjacent faces of said lower and upper rolls.

16. In a vegetable cleaning machine, an upper pair of brush rolls arranged in axially spaced

parallel relation transversely to the flow of the vegetables thereover, means for differentially driving said rolls in a common direction of rotation, the axial spacing and speed of rotation of the rolls being such as to support a part of said vegetables therebetween for advancement across the rolls while permitting others of said vegetables to pass downwardly therebetween and in brushing engagement with adjacent surfaces of the rolls, and a third parallel brush roll mounted beneath the valley formed between said upper pair of rolls to receive upon its upper surface the vegetables passing downwardly between said upper rolls and arranged to direct said vegetables over a path between and in brushing engagement with adjacent faces of said lower roll and one of said upper rolls, said path being uninterrupted to permit said vegetables to be discharged from between the adjacent faces of said lower and upper rolls.

17. In a vegetable cleaning machine, an upper pair of parallel brush rolls arranged transversely to the flow of vegetables thereover, means for driving said rolls in a common direction of rotation, said rolls being mounted in such axially spaced relation as to support a part of said vegetables therebetween for advancement across the rolls while permitting others of said vegetables to pass downwardly therebetween and in brushing engagement with adjacent surfaces of the rolls, a lower pair of axially spaced parallel brush rolls mounted beneath and in staggered relation to said upper rolls whereby vegetables passing downwardly from the valley formed between said upper pair of rolls are received upon the upper surface of one of said lower rolls, and means for driving said lower rolls to cause the vegetables to pass downwardly between the same.

18. In a vegetable cleaning machine, an upper pair of parallel brush rolls arranged in adjacent vegetable supporting relation, means for driving said rolls in opposite directions to effect the discharge of vegetables downwardly therebetween and in brushing engagement with adjacent surfaces of the rolls, and a third parallel brush roll mounted beneath the valley formed between said upper pair of rolls to receive upon its upper surface the vegetables passing downwardly between said upper rolls and arranged to direct said vegetables over a path between and in brushing engagement with adjacent faces of said lower roll and one of said upper rolls, said path being uninterrupted to permit said vegetables to be discharged from between the adjacent faces of said lower and upper rolls.

19. In a vegetable cleaning machine, an upper pair of parallel brush rolls arranged in adjacent vegetable supporting relation, means for differentially driving said rolls in opposite directions to effect the discharge of vegetables downwardly therebetween and in brushing engagement with adjacent surfaces of the rolls, and a third parallel brush roll mounted beneath the valley formed between said upper pair of rolls to receive upon its upper surface the vegetables passing downwardly between said upper rolls and arranged to direct said vegetables over a path between and in brushing engagement with adjacent faces of said lower roll and one of said upper rolls, said path being uninterrupted to permit said vegetables to be discharged from between the adjacent faces of said lower and upper rolls.

20. A vegetable cleaning machine comprising a brushing bed including a plurality of initial brush rolls and a terminal brush roll, means mounting said rolls in adjacent axially spaced parallel relation transversely to the direction of flow of the vegetables thereover, the axial spacing of said initial brush rolls being such as to support a part of said vegetables therebetween for advancement transversely across the rolls, while permitting other of said vegetables to pass downwardly therebetween and in brushing engagement with adjacent surfaces of the roll, means for driving the initial rolls in a common direction of rotation to move their upper surfaces toward said terminal roll, and means for driving the terminal roll in an opposite direction of rotation with respect to said initial rolls to arrest the advance of the vegetables over said initial rolls and discharge them downwardly between the terminal roll and the adjacent initial roll and in brushing contact with their adjacent faces.

21. In a vegetable cleaning machine, a plurality of brush rolls arranged in adjacent axially spaced parallel relation transversely to the flow of the vegetables, means for driving said rolls in a common direction and at differential speeds for advancing vegetables transversely across the rolls and for discharging a portion of the vegetables downwardly therebetween and in brushing contact therewith, a terminal roll arranged in adjacent axially spaced parallel relation with respect to one of said rolls, and means for driving said terminal roll in an opposite direction with respect to the direction of rotation of said rolls to arrest the advance of vegetables thereover and to discharge the same between the terminal roll and one of said rolls and in brushing contact therewith.

22. In an asparagus cleaning machine, a plurality of upper parallel spaced brush rolls arranged transversely to the flow of asparagus thereover and spaced sufficiently closely to provide an asparagus brushing passageway therebetween, means for rotating said rolls in the same direction and at different speeds to move asparagus downwardly through said passageway in brushing engagement with adjacent surfaces of said rolls, a lower brush roll disposed substantially centrally beneath and in parallel relation to said upper rolls and spaced sufficiently closely to said upper rolls to provide an additional asparagus brushing passageway between said lower brush roll and one upper brush roll, all of said rolls having bristles of relatively soft material to avoid undue damage to the asparagus, means for rotating said lower brush roll to cooperate with said upper brush roll to brush and discharge said asparagus through said last mentioned passageway to obtain a further brushing action, and means disposed beneath said lower brush roll for receiving and discharging from the machine the brushed asparagus as the same is discharged from said second mentioned brushing passageway transversely of said rolls.

23. In a vegetable cleaning machine, an upper pair of parallel brush rolls arranged transversely to the flow of vegetables thereover to define therebetween a vegetable brushing passageway extending transversely of the rolls, means for driving said rolls in a common direction of rotation, said rolls being mounted in such axially spaced relation as to support a part of said vegetables therebetween for advancement across the rolls while permitting other of said vegetables to pass downwardly through said passageway in brushing engagement with adjacent surfaces of the rolls, a third parallel lower brush roll mount-

ed beneath the valley formed beneath said pair of rolls and having its axis offset from the vertical medial plane of said valley whereby vegetables passing downwardly through said passageway are received upon the upper surface of said lower roll to one side of its crest, the vegetable receiving side of said lower roll cooperating with one of said upper rolls to form a brushing passageway through which the vegetables may pass transversely in brushing engagement with both of said rolls and be discharged downwardly at one side of said lower roll, and means for driving said lower brush roll in a direction to cause its upper periphery to move towards a said passageway.

24. In a vegetable cleaning machine, an upper pair of parallel brush rolls arranged transversely to the flow of vegetables thereover to define therebetween a vegetable brushing passageway extending transversely of the rolls, means for driving said rolls in a common direction of rotation, said rolls being mounted in such axially spaced relation as to support a part of said vegetables therebetween for advancement across the rolls while permitting other of said vegetables to pass downwardly through said passageway in brushing engagement with adjacent surfaces of said rolls, a lower pair of axially spaced parallel brush rolls mounted beneath and in staggered relation to said upper rolls wheerby vegetables passing downwardly through said passageway are received upon the upper surface of one of said lower rolls to the side of its crest adjacent the valley between said lower rolls, said lower receiving roll being mounted for cooperation with one of said upper rolls and with the other of said lower rolls to form additional successive brushing passageways through which the vegetables may pass transversely in brushing engagement with said upper roll and with both of said lower rolls and be discharged downwardly between said lower rolls, and means for driving said lower rolls in opposite directions.

JOSEPH THOMAS.