Nov. 12, 1929. C. H. PLUMMER 1,735,089

METHOD AND APPARATUS FOR TREATING AND HANDLING VEGETATIVE PRODUCTS

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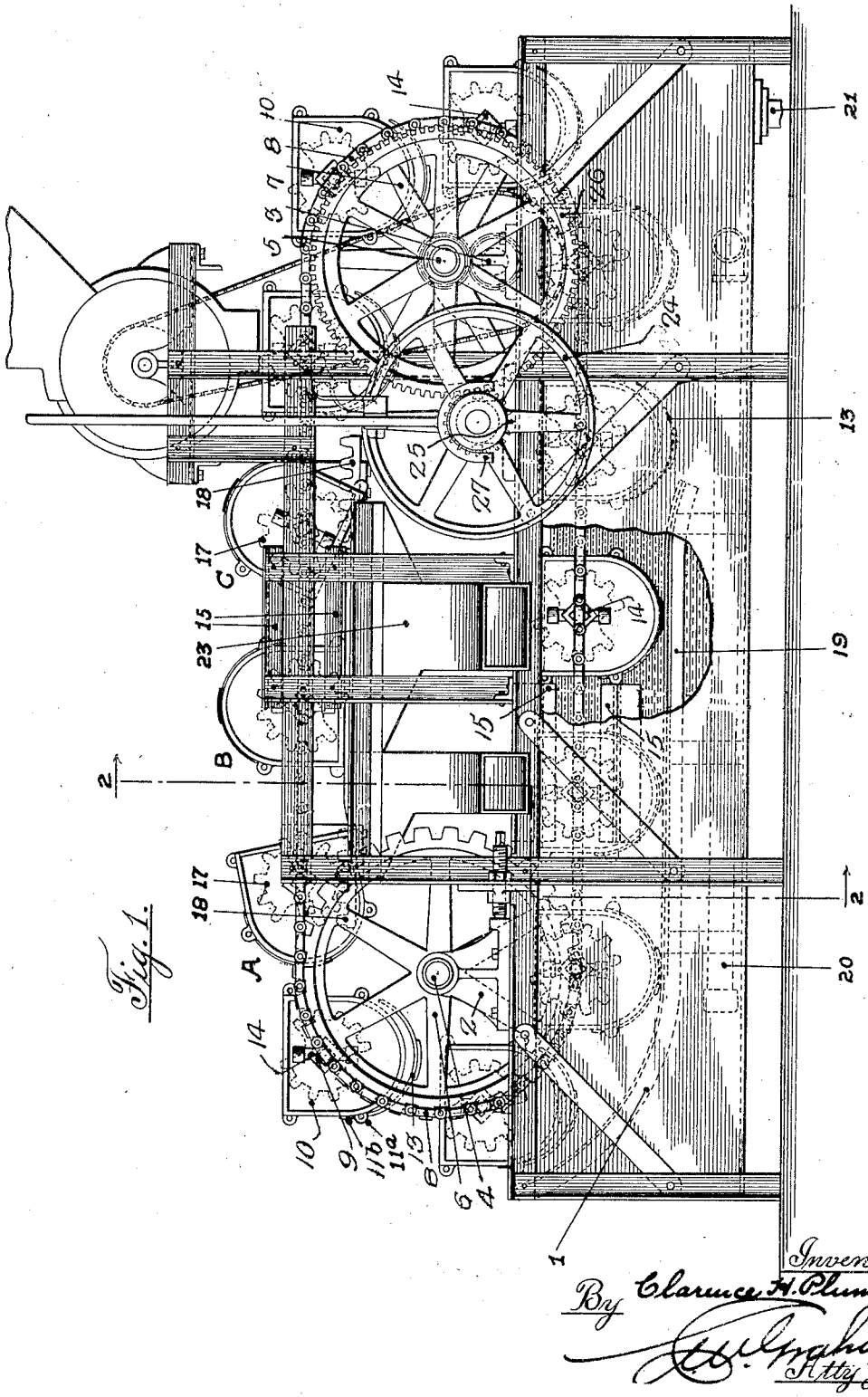


Fig. 1.

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Fig. 2.

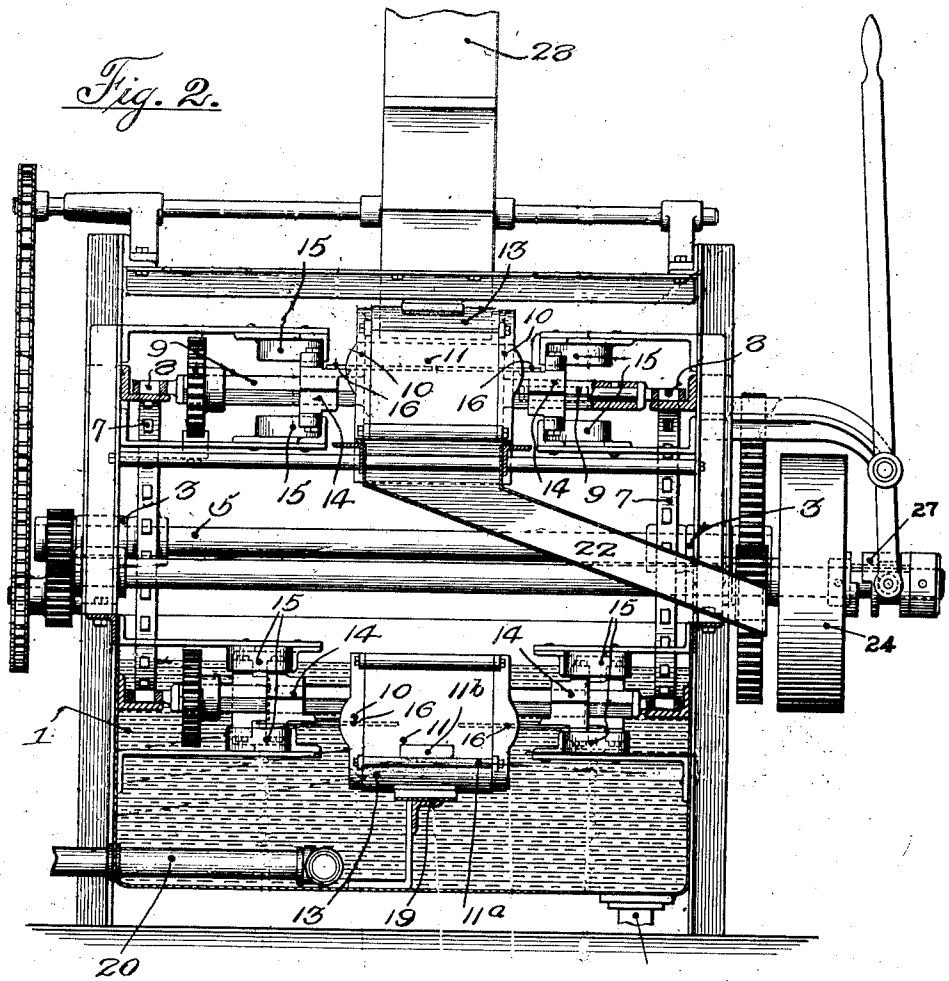
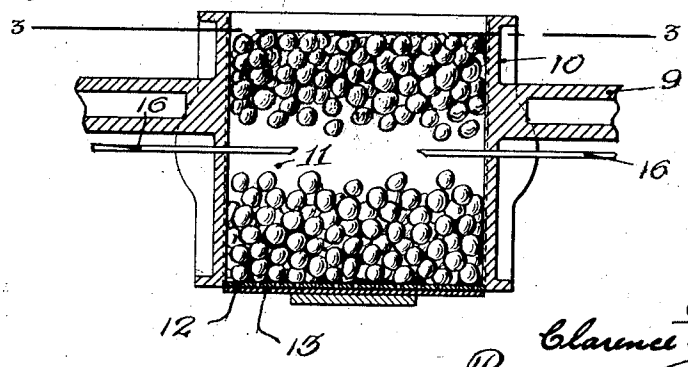


Fig. 3.



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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR TREATING AND HANDLING VEGETATIVE PRODUCTS

Application filed October 9, 1924. Serial No. 742,641.

This invention relates to a method and apparatus for separating fresh grown peas, beans and similar vegetative products by taking advantage of the difference in specific gravity incident to natural growth, as well as other conditions both natural and applied.

When peas, beans and similar products are grown for commercial canning and preserving purpose, land and weather conditions are encountered that are more or less beyond the grower's control. Vitality of seeds; depth of planting; methods of cultivation and harvesting are also more or less of a question under conditions of large production, all of which bring about varying times of maturity or ripening to a condition suitable for canning, so that, while some of the product will have reached just the desired stage of development, other of the product in the same field will have advanced beyond the desired stage of development and perhaps some have not yet reached a suitable stage for canning purposes.

Referring particularly to peas. These are required to be young and tender and of uniform size and quality for the "fancy" grades of pack, which is the quality in greatest demand and brings the highest prices. Even a few mature peas distributed through a can of so called "fancy" goods will bring the grading to a lower level both as to quality and price.

It is the canner's desire, therefore, to increase as much as possible, his pack of "fancy" goods, but in order to do this he must be provided with some means of effectively separating the "fancy" peas from the other commercial grades in a commercial way.

Many attempts have been made to separate the more mature peas from the young and tender grade by utilizing the difference in specific gravity naturally existing between the various grades, by floating them in bulk into and through a suitable aqueous medium, depending on the heaviest and more mature peas to sink into the liquid and the lighter "fancy" peas to float at or near the surface. In order, however, to collect the various grades as separated it has been necessary to either skim the "fancy" peas out of the separating medium by hand or remove them by means of moving conveyors located at different levels in the separating medium. Either method has proven to be unsatisfactory in practice, for, no matter how carefully the hand skimmer may manipulate his ladle, or how uniformly may be the movement of the conveyors, eddy currents are sure to be generated that act, more or less to disturb the separation that may have been effected, so that a partial redistribution and intermingling of the different grades takes place during this manner of removal from the solution.

To obviate this difficulty tanks of considerable depth have been used, in an effort to locate the different grades at levels that would be farther apart when separated, so that the agitation of the aqueous medium would be more or less localized about each moving conveyor and not be transmitted to the other localities. This plan did not work out satisfactorily either. The eddy currents were still generated and caused the sensitively poised peas to follow the currents and escape the conveyors and to finally intermingle with the peas floating at other levels in the solution.

It was also found that the density of the solution increased quite markedly at the lower depths, and where a simple saline solution was used, the density increased to a point where the peas that escaped from the upper conveyors and settled, became so salt laden as to render them unpalatable, and thus was injected into the process a very uncertain and undesirable condition of canning that was entirely beyond the control of the canner. A few salt saturated peas in a can might easily condemn the entire pack. Furthermore, the peas that escaped the upper conveyors and became salt laden naturally increased their specific gravity and gradually dropped to the lower levels and mingled with the peas of a different grade, so that this method was also proven to be impractical for a strictly high grade pack. Further difficulties have also been experienced when

handling such varieties as the "sweet peas" that show little or no difference of specific gravity in the ordinary separating solutions, due mainly to growth conditions. Thus, where it was desired to separate the young and tender peas for the "fancy" pack from the more mature peas of a lower grade the specific gravity method was found ineffective, and as a result it has heretofore been very difficult to get a commercial separation of this variety. The best that the canner could do in this case was to separate his product for size only through the medium of the regular screen method.

In localities where the Canada thistle is prevalent the thistle buds cause much annoyance and expense. The thistles, growing promiscuously throughout the field are harvested with the peas, and in the threshing process the buds become detached from the plants and mix with the peas and have usually to be removed by hand separation.

Attempts have been made to float the thistle buds out of the peas by the use of a salt solution but it was found that a solution of sufficient density to float all of the thistle buds would also float many of the peas, while if the solution was weak enough not to float the peas, then a considerable number of the thistle buds would sink with the peas. At the present time it is the practice to submerge the product in plain water in which the peas sink while the greater part of the thistle buds float and are skimmed off while those that sink with the peas are finally removed by hand.

In experiments connected with this art applicant has discovered several heretofore unknown circumstances.

Where the variety of "sweet pea" is grown as has been referred to and the difficulties of separation encountered through the little, or no difference in specific gravity between young and the more mature peas of the same screened size, applicant has found that if the peas are subjected to heat while in the separating medium, the occluded gases, due to natural growth and development, in the young and tender peas are expanded somewhat, thus rendering them slightly more buoyant, while the more mature peas having more perfectly developed starch grains, contain less of the occluded gases and are less affected by the heat application, so that quite a material difference in specific gravity is temporarily created in the mass of peas in solution, resulting in a very perfect separation of the "fancy" from the lower grades, and this separation is accomplished through the medium of a low density solution and in some instances plain water will suffice to effect the separation.

Applicant has also found that the thistle buds that pass through the screen are of less specific gravity than the peas passing through the same screen, so that by immersing buds and peas of the same screened size in a solution of greater specific gravity than the buds and of less specific gravity than the peas the buds will all float and the peas will all sink, thus effecting a perfect separation without entailing any hand labor.

It is of course understood that usually in the practice of any of my methods or the use of the apparatus, all kinds and varieties of peas handled are preferably first passed through the regular grading screens and thus graded for size and that each size is then separately subjected to the gravitational method of separation, but the preliminary sizing operation is omitted when working on what is termed in the trade as ungraded peas.

To overcome the various difficulties enumerated and place in the hands of the canner a method and apparatus that will give him complete control over the sorting and separating for tenderness of his product, applicant has devised the method and apparatus forming the subject matter of this invention.

The method embodied in the invention contemplates subjecting measured quantities of a vegetative product to the action of a separating medium in such a manner that each measured quantity of product is passed successively through a medium of proper density and at the same time is confined to a comparatively restricted area of unagitated solution whereby the action of gravity may cause a separation of the product into different grades, free from the influence of eddy or other currents; to enclose and confine the separated product in individual compartmented receptacles while in the separating medium so that each separated product may be separately discharged at different points and separately conveyed to other sources of disposal. The apparatus embodied in the invention comprises an endless conveyor mounted to pass through a suitable receptacle containing a solution of proper density for the purpose; multi-compartmented conveyor buckets carried by said conveyor and being adapted to receive a measured quantity of the product to be separated and to successively subject said product to gravitational action in the separating solution for a sufficient time to effect a separation of the different grades of product; gates or valves positioned in operative relation to said conveyor buckets and having movement relative thereto for dividing said buckets into separated compartments and thus confining the separated product to the separate compartments, with means for manipulating said gates or valves to close and open said compartments, and means for inverting said buckets at predetermined intervals for the discharge of the graded product into separate hoppers for conveyance to other points of disposal, as well as means applied to each bucket to prevent the generation of eddy or other disturbing

currents in the separating fluid within the buckets to thus prevent a disturbance of the gravity separation.

It is therefore a principal object of this invention to provide a gravitational method of separation for vegetative products into the commercially designated grades, whereby a more complete and perfect separation is obtained than heretofore.

A further object of the invention resides in providing a gravitational method of separating vegetative products whereby foreign growths are automatically separated and removed from the desired product and thereby eliminate the hand labor at present necessary for a great part of this work.

A further object of the invention resides in providing a gravitational method of separating vegetative products into the commercially designated grades by temporarily producing a gravitational difference in the product, where no such natural condition exists, while said product is immersed in a separating medium, whereby said temporary gravitational difference will effect a separation and segregation of the different grades of product in a manner that will permit of their removal from the separating medium as separate portions.

It is a further object of the invention to provide an apparatus that will automatically measure successive quantities of vegetative product; deposit said measured portions into movable containers; move said containers into and through a separating medium where gravitational action will bring about a vertical separation of the product according to its difference in specific gravity which will cause the product to float in different levels throughout the separating medium while immersed in and passing therethrough; having automatic manipulative means for confining said separated product in individual compartments during removal from said medium; having means in the bottoms of the separating buckets for admitting separating solution and means for closing the bottoms of said buckets against circulation of solution in and through said buckets during the time the product is passing through the separating medium to thereby prevent the generation of eddy or other currents through the solution thus confined to each bucket, and to discharge the product from the separate compartments into hoppers or chutes for conveyance to other points of disposal.

It is also an object of this invention to produce a completely equipped, automatically operative apparatus having means for application of power; coordinating associated instrumentalities for carrying out the steps of the process involved in the gravitational separation of vegetative products as described; operative mechanism that is simple and inexpensively constructed and maintained and that will operate continuously during the rush periods of canning. In fact, a very important object of the invention resides in producing and placing in the hands of the canner, an apparatus that will be wholly dependable in operation, so that no influx of canning product will accumulate in the cannery and spoil for lack of proper and sufficient facilities to handle it continuously as fast as it arrives.

With such objects in view as well as other advantages inherent in the invention, the novel structural peculiarities, novel organization of elements, and the separate and collective operations involved in carrying out the recited objects of my invention, which will be made the subject matter of claims hereto appended, I wish it to be understood that the several necessary elements and combinations constituting the same may be varied in their constructional proportions, placement, general arrangement and operative relation without departing from the scope and nature of my invention.

In carrying out the objects of my invention in a concrete form or machine, further objects, advantages and improvements have been evolved than have been recited, and in order to make the invention more clearly understood there are shown in the accompanying drawings, means and mechanism embodying a structural arrangement and the preferred disposition of the different parts and combinations, in which I have simply illustrated one way of embodying the creative part or conception of the invention in a concrete form or machine, and in so doing I do not wish to limit the claims to the exact details of construction shown.

The described devices are simply embodiments of the invention which other structures might also employ and some of the parts and combinations of parts may be used without the others in different types of such machines without departure from the purview of my invention and I regard myself as entitled to such variations from the shown and described devices as fall within the scope and meaning of the claims hereto appended.

Reference now being had to the accompanying drawings a clearer and better understanding of the general arrangement and operation of the machine will be had, wherein:

Fig. 1 represents a side elevation of the entire machine with portions broken away to better show the operation and placement of the various parts and combinations. This view clearly illustrates the manner of filling the buckets; passing them into the separating solution; enclosing the bottoms of the buckets to eliminate eddy currents therein; discharging the liquid from the buckets after separation; tipping the buckets to discharge the separated product and the manner of heating the separating solution for separating certain varieties of product.

Fig. 2 is a vertical sectional elevation taken on approximately the irregular line 2—2 of Fig. 1 looking in the direction of the arrows, but showing only some of the parts lying beyond the plane of section to avoid confusion and permit a clearer delineation. This view shows the means for creating separate compartments in the individual buckets after separation has taken place to thereby confine and segregate the separated product so that each may be separately discharged from the buckets into different chutes or hoppers for further disposal.

Fig. 3 is an enlarged sectional detail of one of the buckets showing a separation of the product into two distinct zones and the means employed for enclosing each separated product in a separate compartment.

It is to be understood that the drawings accompanying this application are more or less diagrammatic in character; are not necessarily drawn to scale, neither do they necessarily represent the best or the preferred engineering practices in connection with the construction of machines of this type or nature, also the proportions and relation of some parts may be more or less exaggerated in size or shape to better illustrate the application of the invention to an operative machine.

A general arrangement of a machine embodying this invention comprises a solution tank 1, on which is mounted the entire mechanism and framework of the machine. Adjacent either end of the tank 1 are located bearing blocks 2 and 3 carrying the cross shafts 4 and 5 on which are mounted the large sprockets 6 and 7 which in turn carry the endless chain conveyor 8, there are in fact four sprockets and two chains, but I will refer to them in pairs, the rear two being designated by the numeral 6 and the front pair by the numeral 7. The two chains are connected to move in unison and carry the buckets and operating mechanism and they will be designated by the numeral 8 and treated as a single conveyor.

At uniformly spaced intervals along the conveyor 8 are mounted square sectional cross members 9 extending toward the center of the machine, the inner ends of the members 9 having heads 10 which form the ends of the buckets 11, the sides of the buckets being formed of a piece of bent sheet iron or galvanized steel having perforations 12 in the bottom or bent portions, see Fig. 3. Each bucket 11 is provided with a hinged auxiliary bottom 13, hinged to the bucket at 11^a and having a stop lip 11^b resting against the side of the bucket when in its open position as shown in some places in Fig. 1, which tends to limit its movement and prevent it from swinging too freely.

Each of the square sectional members 9 have slidably mounted thereon cam blocks 14 actuated by cams 15. Each cam block 14 carries a cut off blade 16 which blades extend through slots in the heads 10 and act to divide each bucket into two compartments, the cams 15 moving the blocks 14 carry these blades into and out of the buckets at proper intervals to produce the result desired.

One of each pair of the squared members 9 carries an interrupted gear 17 which are inactive until each bucket reaches the top of the machine and starts its travel therealong when the teeth of the gears 17 engage with teeth on the racks 18 when the buckets are turned in the manner as shown in Fig. 1 and which will be more fully described.

Arranged in the bottom of the tank 1 is a track member 19 so positioned that as each bucket 11 approaches, the auxiliary bottom 13 is closed tightly against the perforated bottom of each bucket, the track 19 is so shaped at the leaving end to permit each of the auxiliary bottoms to swing away from the bottom of the buckets before they leave the tank, the purpose of this action will be explained further on.

Also arranged in the bottom of the tank 1 is a steam or hot water pipe 20 by means of which the separating solution is warmed to any degree desired. At 21 is indicated a means for draining the tank of its solution, a suitable valve being located in the drain pipe, not shown.

22 and 23 indicate discharge chutes for receiving the separated peas from the buckets as they are discharged, from which they are conveyed to suitable receptacles or to another conveyor to be carried to some source of disposal, neither of these are shown.

A free running pulley 24 takes power from any suitable source and through the medium of the pinion 25 and gear 26 drives the entire mechanism of the machine, the clutch 27 serving to start and stop the machine at will.

An automatic feed device is provided at 28 which delivers a measured quantity of material to each bucket as it passes but since this device is the subject matter of a copending application filed by Mr. John Schmidt, of Hoopeston, Illinois, Serial No. 729,566 nothing need be said of its operation in connection with this invention.

The operation of this invention as embodied in the machine illustrated by the accompanying drawings will now be described. This description will particularly refer to its operation when handling peas of the different varieties. The operation may or may not differ when handling other vegetative products, and the operation may differ from this description in handling peas where farming and factory conditions vary.

The hopper of the feed device 28 being filled with peas and the machine started, peas will be successively delivered in measured

quantities to each bucket as it passes under the discharge mouth of the feed device. When the buckets 11 pass under the feed device the cut off blades 16 are fully retracted so that the full charge of peas drops into the bottoms of the buckets. The buckets are pivoted above their centers so that they always hang bottom down. From the receiving station until they reach the track member 19 the auxiliary bucket bottoms 13 hang in an open position as indicated at the right of Fig. 1. The conveyor 8 moving continuously carries the buckets successively into and through the solution tank 1. The solution tank may for the purpose of this description be charged with a saline solution and we may for convenience consider that we are separating the ordinary type of commercial peas. As soon as the buckets enter the solution it begins to percolate through the perforations 12 in the bottoms of the buckets and fills the buckets up to the tank level which may be to the line 3—3 of Fig. 3. The separating solution entering through the perforations in the bottoms of the buckets agitates the body of dormant peas lying therein and causes them to float therein. By the time the buckets are full of solution they will have reached the track member 19 when the auxiliary bottoms 13 will be tightly closed so that no more solution will enter through the perforations, that is there will be no circulation of liquid therethrough. The bottoms 13 are not necessarily liquid tight but they must be tight enough to stop circulation between the liquid in the buckets and that in the tank. As soon as agitation of the liquid in the closed buckets ceases, which will be practically immediately the bottoms 13 are closed, the floating peas will gradually begin to locate in upper or lower levels according to their state of maturity, and by the time the buckets will have reached the cams 15 the peas will have assumed positions as indicated in Fig. 3. The lighter ones floating at the top and the heavier ones having settled to the bottom. The separation now having taken place it becomes necessary to establish an impassable barrier between the two groups. This I accomplish by means of the blades 16 entering the ends of the buckets through movement of the cam blocks 14. As the buckets approach the cams 15 the rollers on the cam blocks 14 are engaged by the cams and the blades 16 are moved into the buckets until their inner ends meet thus forming a metal division wall between the two groups of separated peas and dividing each bucket temporarily into two compartments.

The blades 16 may be perforated the same as the bottoms of the buckets to facilitate the flow of solution. As soon as the blades 16 have divided the buckets into the two separate compartments the buckets may be removed from the solution and the auxiliary bottom released from contact with the member 19 to permit the solution to flow from the buckets back into the tank. The heavy peas will now rest on the bottoms of the buckets while the lighter ones will rest on the blades 16. As the buckets travel around with the conveyor the interrupted gears 17 will engage the first of the racks 18 which will tilt the buckets as at A Fig. 1 and discharge the body of light peas resting in the top compartment of each bucket, into the chute or hopper 22. The buckets are further turned as they move forward and at B they are completely upside down. At this point the cam blocks will enter the zone of the cams 15 and the blades 16 will be withdrawn from the buckets and permit the peas from the lower compartment to discharge into the chute or hopper 23. As the buckets continue to move forward the interrupted gears 17 will in turn engage the second of the racks 18 when the buckets will be turned into their normal positions, the start of which is indicated at C. The sequence of operations as just described will be repeated ad infinitum.

Separation of the variety known as "sweet peas" will be substantially as described for the regular grades of commercial peas except that on account of the very slight difference in specific gravity between the tender and the more mature peas of this variety, of the same graded size, it becomes necessary to establish, temporarily, a greater degree of specific gravity between the two grades so that separation can be effected as has been described. This temporary difference in specific gravity is established by means of heating the separating solution which will have the effect of rendering the young and tender peas slightly more buoyant through expansion of the occluded gases due to natural growth and development and will permit them to float at a higher level in the solution than the more mature peas, which on account of their more highly developed starch grains are not rendered as buoyant by the warm solution as are the younger peas. The warming of the solution brings about a separation in substantially the same manner as when treating the regular types and varieties.

The separation of thistle buds from graded peas is accomplished by adjusting the separating solution so that its gravity test is just between the gravity of the buds and the peas. This will permit all of the peas to sink into the solution but will cause all of the thistle buds to float, their separation is then accomplished in the same manner as with the regular peas.

The separating blades 16 as I have termed them in the description may also be designated as valves, gates, septums or any other synonymous term.

The length of the apparatus shown in the drawings may not be sufficient for some con-

ditions, this however, is only a matter of engineering and may be constructed of such length as may be necessary to give sufficient time for effective separation. Throughout the specification and claims the words "unagitated", and "quiescent", have been used synonymously as indicating a condition of the separating solution during the period of separation of the different grades of peas while immersed therein and while moving therethrough. I do not mean to indicate thereby that there is no motion whatever in the body of solution in contact with the charges of peas being separated. A little agitation or movement in the solution occasioned by moving the containers therethrough will not materially interfere with proper separation, but wholly uncontrolled agitation or movement might affect the separation. For example if the compartmented members carrying the individual charges of peas were moved slowly through the solution there might not be sufficient movement imparted to the solution in contact with the peas to interfere with proper separation. So that wherever these words are used it is understood that they mean, sufficiently unagitated, or sufficiently quiescent to permit of proper separation taking place under normal operation. Since the compartments charged with the peas move through and in contact with the solution and the solution runs into the compartments with the peas when first immersed there is at that instant considerable agitation, but immediately the compartments are filled to the proper level with solution the agitation ceases and a substantially quiescent condition prevails thereafter.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. The method of segregating different grades of peas consisting of immersing a quantity of mixed grades in a quiescent solution in which a separation takes place due to the difference in specific gravity whereby the lighter peas will float and the heavier ones sink, then while the peas are still immersed automatically introducing a septum between the separated groups to maintain the separation while removing them from the solution.

2. A method of segregating differing grades of peas into separate groups, consisting in placing a mass quantity of mixed grades into a quiescent solution wherein a separation takes place forming separate groups due to the difference in specific gravity of the differing grades, then automatically introducing a septum between the separated groups to maintain the separation and then removing the groups simultaneously from the solution.

3. A method of segregating the different grades of peas from a mass of mixed grades consisting in immersing a quantity of mixed grades in a quiescent solution, protecting them from the interference of agitation whereby the lighter peas will float at levels above the heavier peas, then automatically introducing a separating medium between the segregated groups to maintain the separation while removing them from the solution.

4. A method of segregating the different grades of peas from a mass of mixed sizes consisting in successively immersing measured groups of mixed grades of peas in a quiescent aqueous medium, protecting each measured group from the influence of agitation whereby the different grades of peas in that group will assume different levels in said solution, then automatically and successively introducing a separating medium between the different grades in each group to maintain the separation and then successively removing each separated group from the solution.

5. A method of segregating the different grades of peas from a mass of mixed grades consisting in placing measured quantities of mixed grades of peas into separate containers, successively immersing said containers into a separating medium, charging each container with medium, closing each container against further ingress of medium to protect the contained peas from the influence of agitated medium, allowing each contained mass of peas to separate through flotation to different levels, then automatically introducing septums between the separated groups in each container, opening each container to permit outflow of medium and removing the containers from said medium and discharging said segregating groups of peas at different points.

6. A method of segregating the different grades of peas from a mass of mixed grades consisting in subjecting a quantity of mixed grades to the influence of a quiescent solution, heating said peas while in said solution to temporarily create a greater difference in buoyancy than naturally exists in the mass and grades whereby those of greater buoyancy will float at levels above those of less buoyancy, then automatically introducing a septum between the upper and lower groups and then removing the segregated groups from the solution.

7. A method of segregating the different grades of peas from a mass of mixed grades that show little or no difference in buoyancy consisting in subjecting a quantity of mixed grades of peas to heat to temporarily create a greater difference in buoyancy while within the influence of a quiescent medium in which the more buoyant will float at different levels than those less buoyant, then automatically introducing a dividing wall between the separated groups and then removing them from the solution.

8. A method of segregating the differing

grades of peas from a mass of mixed sizes consisting in placing a quantity of mixed grades of peas into a separating chamber immersed in a quiescent solution wherein separation takes place due to the difference in specific gravity of the different grades of peas, then automatically isolating the separated groups in said chamber so that each may be independently handled and then removing the groups and chamber from the separating solution.

9. The method of treating peas for canning consisting of grading the peas for size, subjecting separate quantities of a given size and mixed grades to a quiescent separating medium, confining each separate quantity to a portion of unagitated medium in a compartment whereby the more buoyant will float at different levels than the less buoyant, then automatically isolating the groups occupying different levels in said compartment so that each may be handled independently of the others and then removing the separated groups and compartment from the solution.

10. The method of treating peas for canning consisting of grading the peas for size, subjecting separate quantities of a given size to a quiescent separating medium, confining each separate quantity to a portion of unagitated medium in a compartment whereby the different grades of peas will group in separated locations within said compartment, then automatically isolating each group so that each may be handled independently of the others and then removing the isolated groups and compartment from the separating medium.

11. The method of separating thistle buds from peas consisting in subjecting a mixed quantity of thistle buds and peas to a quiescent separating solution the specific gravity of which is greater than the thistle buds but less than the peas whereby the peas will sink in the solution while the thistle buds will float near the surface, then automatically introducing a division wall between the separated groups and then removing the separated groups from the solution.

12. The method of separating thistle buds from peas where both are of the same graded sizes consisting in placing mixed quantities of peas and thistle buds in a compartment and subjecting them to a quiescent separating medium the specific gravity of which is less than the peas but greater than the thistle buds whereby the peas and thistle buds will group in separated locations, then automatically isolating the groups within the said compartment so that each may be handled independently and then removing the groups from the solution.

13. An apparatus for segregating the differing grades of peas from a mass of mixed sizes by taking advantage of the difference in specific gravity of the different grades comprising means for containing a quantity of mixed grades of peas, a container holding a quiescent separating medium, means for moving the peas through said medium in a manner to prevent agitation of said medium while the peas are assuming separate locations and then providing means for segregating the separated groups comprising a septum that is caused to enter between the separated groups as they are moved through the separating medium with means for then separately discharging the separated groups.

14. An apparatus for separating the differing grades of peas from a mass of mixed sizes by taking advantage of the difference in specific gravity of the different grades comprising a compartment for holding a quantity of mixed grades of peas, a container for holding a quiescent separating medium, means for immersing said compartment in said medium so that the peas contained therein will be separated into groups according to their gravity, then while said separated groups are moving, introducing a septum between said groups to isolate them, with means for then handling each group separately.

15. An apparatus for segregating the differing grades of peas from a mass of mixed sizes by taking advantage of the difference in specific gravity of the different grades comprising a series of compartments for receiving measured quantities of peas, means for successively moving said compartments through a predetermined path, a container for holding a separating medium through which said pea compartments are moved to permit the mass of mixed grades to form separate groups, automatic means for introducing division walls between the separated groups of peas within said containers then providing means for removing the groups from said containers and discharging each separately.

16. An apparatus for segregating the differing grades of peas from a mass of mixed sizes by taking advantage of the difference in specific gravity of the different grades comprising an endless conveyor, a series of pivoted containers on said conveyor, means for measuring a mixed quantity of peas for each pivoted container, a solution tank containing a separating medium and through which each pea container moves to successively immerse the peas therein, whereby the peas of differing grades will assume different levels while immersed, means for then entering each container while immersed in said medium for isolating each group so that each may be handled separately when removed from said medium.

17. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the different grades comprising a series of moving containers for receiving measured quantities of mixed grades

of peas, means for moving said containers into a separating medium whereby the peas of differing grades will assume separate locations, then automatically isolating the groups of separated peas by means of introducing a septum between the groups that will permit of handling each separated group independently and then removing and discharging each group.

18. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the different grades comprising an endless conveyor carrying a series of pivoted containers each of which is adapted to receive a measured quantity of mixed grades of peas, a solution tank in which said conveyor moves to successively immerse the said containers, means for admitting solution from said tank to said containers whereby the peas of different grades in each container will assume separated locations, then automatically entering a division wall between the separated groups while they are moving through said medium to permit discharging each group separately.

19. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the different grades comprising a tank carrying a supply of separating medium, an endless conveyor mounted to move into and through the medium in said tank, containers carried by said conveyor each adapted to receive and carry a measured quantity of mixed grades of peas, means for charging each of said containers with a measured quantity of mixed grades of peas, means in said containers for admitting separating medium into said containers with said peas whereby the peas of different grades will assume different locations in said containers, means entering said containers to isolate each group of separated peas whereby each group may be independently handled and separately discharged from said containers.

20. An apparatus for segregating the differing grades of peas from a mass of mixed grades of peas by taking advantage of the difference in the specific gravity of the different grades comprising a tank carrying a supply of separating solution, an endless conveyor mounted to move into and out of said solution, containers mounted on and carried by said conveyor and each adapted to receive a measured quantity of mixed grades of peas, means for admitting solution into said containers from said tank whereby the peas immersed in said solution will assume different locations according to their differing specific gravity, means for isolating each separated group in each container, said means being carried by said conveyor and operable through the movement of said conveyor whereby said isolated groups of peas may be independently discharged from said containers.

21. An apparatus for segregating the differing grades of peas from a mixed mass of different grades by taking advantage of the difference in specific gravity of the different grades when immersed in a suitable solution, a tank carrying a supply of solution, an endless conveyor mounted to move into and out of said solution, containers mounted on and carried by said conveyor, means for charging said containers with measured quantities of mixed grades of peas, means for admitting solution into said containers with said measured quantities of peas, means for preventing further ingress of solution after said containers are supplied whereby the peas in each container may assume differing locations according to their difference of specific gravity, means for isolating each separated group and then independently discharging each group from said containers.

22. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference of specific gravity when said peas are immersed in a suitable solution comprising a tank containing a supply of solution, an endless conveyor mounted to move into and out of said solution, containers mounted on and carried by said conveyor, means for placing a measured charge of mixed peas to each container, means for admitting solution to each container with the peas therein whereby the said peas will assume different locations according to their difference of specific gravity, means movable with and entering into each container to isolate each group of separated peas therein so that each group may be independently discharged from said containers.

23. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the different grades when immersed in a suitable separating solution, comprising a tank for containing a supply of solution, a conveyor mounted to move into and out of said solution, said conveyor carrying in spaced relation a series of containers mounted to rotate in relation to said conveyor, means for placing a quantity of mixed peas in said containers, means for admitting separating solution into said containers with said peas whereby said peas are separated according to their difference in specific gravity, means for isolating said separated peas so that they may be discharged from said containers in separate groups.

24. An apparatus for separating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the differing grades, com-

prising a tank for holding a supply of separating medium, a conveyor mounted to move into and out of said tank, containers carried by said conveyor for immersing measured quantities of peas in said solution, means for admitting solution to said containers and means moving at right angles to the path of travel of said containers for isolating the groups of separated peas in said containers so that each group may be separately discharged therefrom.

25. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the different grades when immersed in a suitable solution, comprising a tank for containing a supply of separating medium, a conveyor moving into and out of the solution in said tank, pivoted containers carried by said conveyor and adapted to receive measured charges of mixed peas, means for placing measured charges of peas into said containers, means for admitting solution into said containers with said peas, movable septums entering the said containers to segregate the groups of peas separated by said solution whereby said groups may be independently discharged from said containers.

26. An apparatus for segregating the differing grades of peas from a mass of mixed grades of peas by taking advantage of the difference in specific gravity of the different grades when immersed in a suitable separating medium, comprising a tank for containing a suitable separating solution, a conveyor moving into and out of said tank, a series of containers pivotally mounted on said conveyor, means for placing a measured quantity of peas into each container to be immersed in the solution in said tank, means for admitting solution to each container with the peas therein, means for cutting off the flow of solution into said containers while the separation of said different grades of peas is taking place, means for isolating the separated groups of peas whereby each group may be independently discharged from said containers.

27. An apparatus for segregating the differing grades of peas from a mass of mixed grades by taking advantage of the difference in specific gravity of the different grades when subjected to the action of a suitable solution, comprising a tank for containing a supply of solution, a conveyor moving into and out of said tank, containers pivotally connected with said conveyor for carrying measured quantities of mixed peas into and through said solution, whereby the different grades of peas will assume different locations according to their specific gravity, means carried by said conveyor for entering each of said containers and isolating the said groups of separated peas and means also carried by said conveyor for turning said containers on their pivots to thereby discharge the said separated groups of peas into separate chutes.

28. A container for a pea separating machine comprising a vessel having an open top and a perforated bottom, the open top for receiving a measured charge of mixed grades of peas and the perforated bottom for admitting a separating solution to said container with the enclosed peas, an auxiliary bottom for closing said perforations to prevent further flow of solution therethrough after said container is supplied, a tank of solution in which to immerse said container while the contained peas are assuming a separated condition, a movable septum for entering said container and isolating the separated groups of peas whereby they may be independently discharged with means for tilting the said container to effect the said discharge.

29. An apparatus for treating and handling vegetative products comprising a series of moving pockets, means for depositing a charge of mixed product into said pockets, means for containing a treating medium, means for moving said pockets into and out of said medium whereby the product entering said medium is in a mixed mass and by contact with said treating medium is separated into groups of differing characteristics, then placing a septum between the separated groups while they are moving through said medium to maintain the separation and permit of independent discharge of said groups from said apparatus.

30. An apparatus for treating and handling food products comprising a series of moving pockets each adapted to carry a charge of mixed product, means for containing a treating medium, means for moving the product charged pockets through said medium, whereby as the product passes through said medium the same is separated into groups due to the difference in specific gravity of the mixed product, means within the path of said moving product for entering between the separated groups while they are moving through said medium to permit of their individual discharge from the apparatus.

31. An apparatus for treating and handling food products comprising means for containing and moving a mixed mass of product through a predetermined path, a container for holding a separating medium, means for moving the mixed mass of product through the said separating medium whereby individual particles of said product will be segregated into separate groups according to their differing characteristics, means while said product is moving through said separating medium for entering between the separated groups to thereby isolate the same and maintain the separation after removal from said medium to permit of their separate discharge from the apparatus.

32. An apparatus for treating and handling green peas for canning purposes comprising a compartment for containing a mixed mass of peas, means for moving said compartment and mass of peas through a predetermined path, a container for holding a separating solution through which said compartment with its charge of peas is moved, whereby as the said mass is immersed in said solution individual peas will segregate into groups according to their differing characteristics, means for then entering between the separated groups of peas to isolate the same and maintain the separation after removal from said medium, with means for then separately discharging the said isolated groups from the apparatus.

33. An apparatus for segregating the differing grades of peas from a mass of mixed sizes by taking advantage of the difference in specific gravity of the different grades, comprising a series of containers for receiving quantities of peas, means for successively moving said containers through a predetermined path, a container for holding a separating medium through which said pea containers are moved, a division wall for then entering between the separated peas within the pea containers to maintain the separation after removal from said medium and separate discharge points for the separate groups of peas.

34. An apparatus for grading peas comprising a series of compartments each adapted to contain a portion of a mixed mass of peas, a container having therein a solution of separating medium, means for successively moving the compartments containing the mixed masses of peas into and out of said solution, immersion in said solution causing a separation of said mixed masses of peas into groups according to their differing characteristics, means located relative to said separated groups of peas to enter therebetween and isolate each group to maintain said separation after removal from said medium, with means for then discharging each group at a different point from said apparatus.

35. An apparatus for separating mixed grades of peas by utilizing their differing specific gravity comprising a tank of separating medium, an endless conveyor mounted for passage through said medium, pivoted containers carried by said conveyor, movable division walls mounted to enter said containers, means for turning said containers on their pivots to discharge material therefrom, means forming a part of each container for admitting medium thereto during immersion in said medium, other means for closing said admitting means with means along the path of said containers for performing the recited operations.

36. An apparatus for separating mixed grades of peas by utilizing their differing specific gravity comprising a tank of separating medium, a conveyor mounted for passage through said medium, a plurality of containers carried by said conveyor, division walls adapted to enter each container and divide it into separate compartments after it has entered the said medium and to maintain said separate compartments until the contents have been removed therefrom, means for then removing said division walls and establishing the single compartment in said containers.

37. An apparatus for separating mixed grades of peas by utilizing their differing specific gravity comprising a tank of separating medium, a conveyor mounted for passage through said medium, a plurality of separate containers carried by said conveyor and immersed in said medium, a division wall mounted to enter each container as it is moved through said medium and temporarily convert it into a multi-compartment container and maintain said condition until the contents have been removed from the separate compartments, with means for supplying charges of mixed peas to said containers and means permitting the separate discharge of the separated grades.

38. An apparatus for separating mixed grades of peas by utilizing their differing specific gravity comprising a tank of separating medium, a conveyor mounted for immersion in said medium, a plurality of single compartment containers forming a part of said conveyor and adapted for immersion in said medium, means for charging each container with a quantity of mixed peas, means for entering said containers while they are moving through said medium and temporarily converting them into multi-compartmented containers to isolate separated groups of peas therein and to maintain said condition until the separated groups are separately discharged from said containers.

39. An apparatus for treating vegetable products by utilizing their differing specific gravity comprising a tank of separating medium, a conveyor carrying a series of single compartment containers and mounted for movement through said tank of medium, means for charging each container with a quantity of product, a division wall located to enter each container during its movement through said medium and temporarily divide it into two compartments and to maintain this condition until the peas in said compartment are separately discharged.

40. An apparatus for treating products for food purposes by utilizing their differing specific gravity comprising a tank of separating medium, a conveyor carrying a series of single compartment containers and mounted for movement through said tank of medium, means for entering each container while it is immersed in said medium and converting it

into a multi-compartmented container to thereby isolate the separated groups of product in each container and to maintain said condition until the isolated groups of product have been separately discharged from each container, with means for charging each container with product when it is in single compartment condition.

41. An apparatus for taking mixed groups of articles and separating each into a plurality of groups comprising a separating medium to act on said articles through their differing specific gravity to cause them to assume different locations in said medium, a carrier having single compartment containers to receive groups of mixed articles and immerse them in said medium while in said containers in a manner permitting the group in each container to divide into separate groups according to their density, means for then entering each container and forming a division wall therein to divide the separate groups and thus hold them until they are separately discharged from the apparatus with means for charging each container with a group of mixed articles, while it is a single compartment container.

42. An apparatus for taking mixed groups of articles and separating each into a plurality of groups comprising a separating medium, a carrier, single compartment containers associated with said carrier, means for immersing said carrier and compartments in said medium, means for charging each compartment with a mixed group of articles before entering said medium, said medium acting on said articles to separate them into isolated groups, means immersed in said medium for entering said containers and forming a division wall therein to permanently divide the isolated groups therein and permit of their separate discharge therefrom after removal from said medium.

43. An apparatus for taking mixed groups of articles and separating each group into other groups comprising a carrier, single compartment containers associated with said carrier, a tank of separating medium, means for moving said carrier and containers from a higher to a lower level, means for charging each container with a group of articles at the higher level, means for moving each container into said medium at a lower level wherein said medium will act on said articles to separate them into isolated groups within each container, means immersed in said medium for entering each container and forming a division wall therein to permanently separate the isolated groups and permit of their separate discharge from the container at the higher level.

44. An organized unitary apparatus for separating mixed grades of peas by utilizing their differing specific gravity comprising a tank and a supply of separating medium, a carrier, single compartmented containers associated with said carrier, means on a level higher than said medium for charging each container with a group of mixed peas, means for moving said carrier and associated containers from said higher level down into said medium where said peas assume isolated groups according to their density, means immersed in said medium for entering said containers as they move therethrough and permanently dividing each container into two compartments to permanently divide the isolated groups of peas therein and permit of their separate discharge from said divided compartments after removal from said medium.

45. An apparatus for separating the different grades of peas from a mass of mixed grades by creating a difference in specific gravity in the different grades where little or no difference exists, comprising a tank for containing a supply of separating medium, means for conveying a quantity of mixed grades of peas through the solution in said tank, means for heating the peas in the said solution whereby certain grades are temporarily rendered more buoyant whereby they will assemble in separated groups, automatically operated means for entering between said groups to render them capable of separate discharge from said conveying means, and associated means for operating said apparatus.

46. An apparatus for separating thistle buds from peas of the same graded size comprising a tank for carrying a supply of solution of a predetermined specific gravity, means for carrying a quantity of mixed thistle buds and peas into and through said solution, the specific gravity of said solution being such that the thistle buds will float at or near the surface while the peas will sink to lower levels with automatic means for entering between the separated groups to permit of separate discharge from said carrying means.

47. A tank for containing a body of solution, a frame work mounted on said tank, an endless conveyor mounted for continuous movement into and out of said tank, a feed hopper located above said conveyor, buckets pivoted to said conveyor and carried into and out of said solution by said conveyor, said buckets having open tops, perforated bottoms and an auxiliary bottom, septums carried by said buckets, stationary means along the path of travel for moving said septums into and out of said buckets, means along the upper run of said conveyor for discharging the contents from the bucket that are above said septums and other means moving said septums to permit the discharge of the contents below said septums and separate means for receiving the separate discharges.

48. A tank for a solution, an endless con-

veyor, pivoted buckets on said conveyor, a feed hopper, movable division walls carried by each bucket, an auxiliary bottom for each bucket, a stationary member in said tank for closing said auxiliary bottoms after solution has entered the buckets, means along the upper run of said conveyor for turning each bucket on its pivot to discharge part of the contents, means for then permitting the discharge of the balance of the contents, means for completing the turning of each bucket to bring it back to normal receiving position, means carried by each bucket and operable from stationary means for entering said buckets and separating the contents within said buckets while in said solution and means for timing the feeding of material to said buckets.

49. An apparatus for grading peas comprising a solution tank, an endless conveyor, a feed hopper, pivoted buckets on said conveyor, a perforated bottom in each bucket, a cover for said bottom to cover said perforations, means for moving said conveyor continuously into and out of said solution, means in said solution for closing the cover over said perforations after solution has entered the buckets, division walls carried by each bucket for separating the peas therein while immersed, stationary means for operating said division walls, means connected with the pivot of each bucket for turning said buckets to discharge the contents, stationary means for engaging the pivot means to turn said buckets and give each bucket a complete turn over to empty first the contents above the division walls and then the contents below the division walls and replace the buckets in normal receptive position for a new charge of peas.

50. An apparatus for grading peas comprising a solution tank an endless conveyor, means carrying said conveyor to permit its lower run to be constantly immersed in said solution tank, buckets pivotally mounted on said conveyor, means for charging each bucket with a mass of mixed grades of peas, a perforated bottom in each bucket, an auxiliary cover for the perforation in each bucket, means in said solution to close said auxiliary covers after solution has entered each bucket, division means carried by each bucket to divide it into two compartments, means for operating said division means while the peas are immersed in the solution to separate the mass into two groups, means for turning the buckets on their pivots to discharge the contents above the division means, means for then removing the division means to permit discharge of the balance of the contents and separate means for receiving the separate discharges.

51. A method of separating the different grades of peas from a mass of mixed grades consisting in placing a charge of mixed grades of peas into a compartment, moving said compartment into and through a solution adapted to cause a separation of the mass due to the difference in specific gravity of the peas in the mass wherein the lighter grades will separate from the mass and float in the solution within the compartment, then while separated and still immersed in the solution automatically introducing a septum between the separated groups to permit of independent discharge of the groups when removed from the solution.

52. A method of separating the different grades of peas from a mass of mixed grades consisting in placing a charge of mixed grades into a compartment, moving said compartment and peas through a sufficiently quiescent solution to permit a separation of the mass into separated groups due to the difference in specific gravity of the different peas constituting the mass wherein the lighter peas will float in the solution within the compartment, then while so separated and still immersed in the solution automatically introducing a septum between the separated groups to permit of independent discharge of the groups when removed from the solution.

53. A method of separating the different grades of peas from a mass of mixed grades consisting in placing charges of mixed grades in a series of compartments, immersing said compartments successively into a solution in a manner to produce a minimum of agitation so as to permit a separation of the mass into separated groups due to the difference in specific gravity of the peas constituting each charge wherein the lighter peas will float in the solution within each compartment, then while so separated and still immersed in the solution automatically introducing a septum between the separated groups to permit of independent discharge of the groups when the compartments are removed from the solution.

54. A method of separating the different grades of peas from a mass of mixed grades consisting in placing charges of mixed grades in a series of compartments, immersing and moving said compartments successively into and through a solution in a manner to produce a minimum of agitation so as to permit a separation of the charges into separated groups due to the difference in specific gravity of the peas constituting each charge while the compartments and peas are in motion wherein the lighter peas in each charge will float while immersed and moving through said solution, then automatically introducing a septum between the separated groups to permit of independent removal and discharge after being taken from the solution.

In testimony whereof I affix my signature.

CLARENCE H. PLUMMER.