

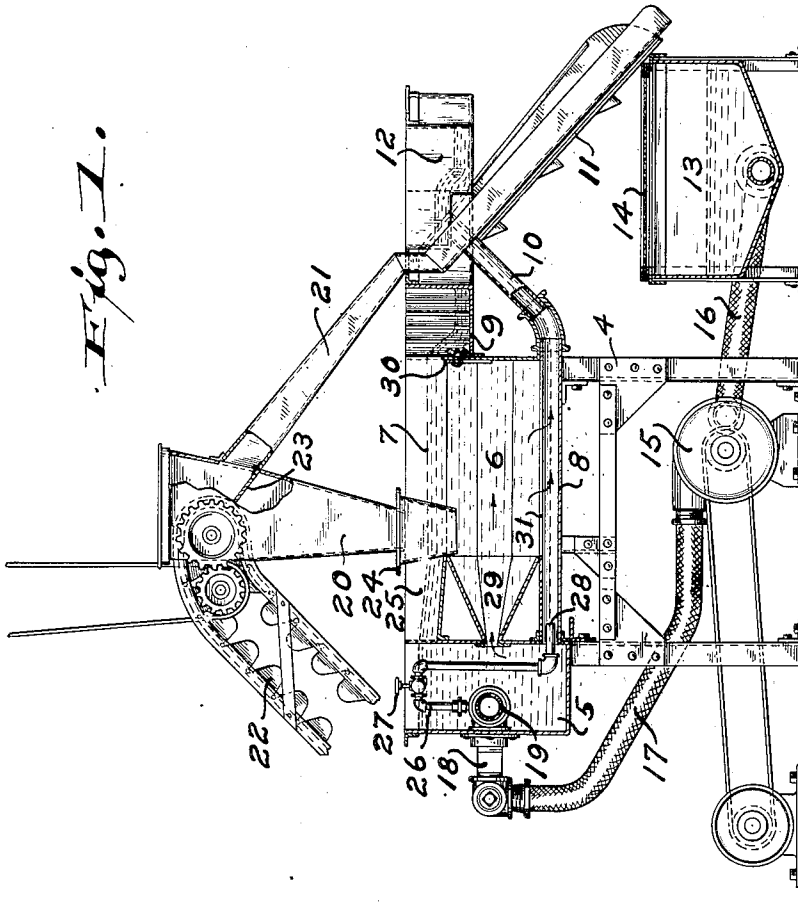
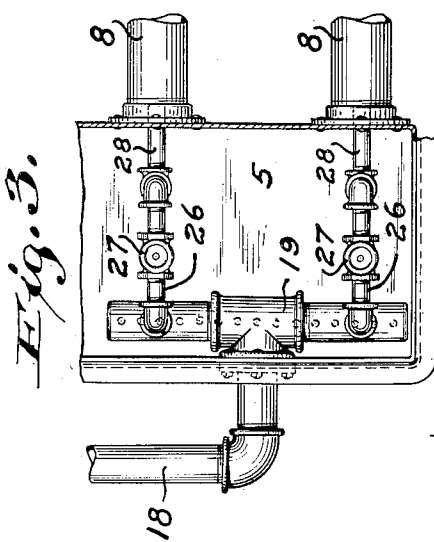
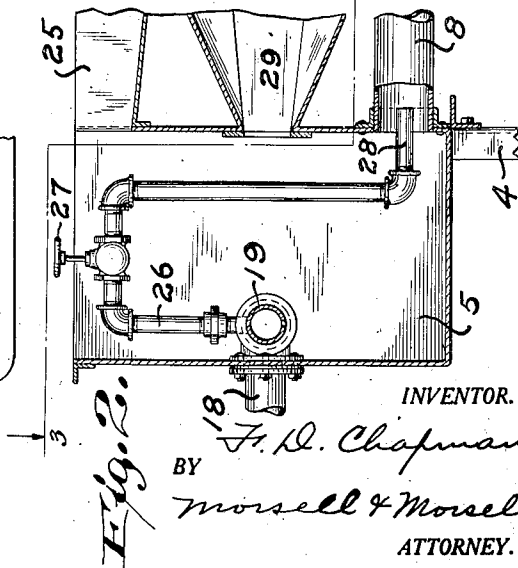
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QUALITY GRADER

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QUALITY GRADER

Application filed October 13, 1930. Serial No. 488,215.

The present invention relates in general to improvements in the art of grading granular material, and relates more specifically to improvements in the construction and operation of quality graders for edible granular substances, such as peas, beans, berries or the like.

An object of the invention is to provide an improved quality grader which is simple and compact in construction, and which is moreover highly efficient and flexible in its operation.

It has heretofore been proposed, as shown in U. S. Application Serial No. 413,507, filed December 12, 1929, to grade peas or the like as to quality, by utilizing three superimposed streams of brine flowing horizontally at different velocities, the mixed peas being introduced into the intermediate relatively slow moving stream and being maintained therein for a sufficient length of time so that the floaters and sinkers are permitted to rise and fall respectively, into the upper and lower adjoining streams. While this prior method has proven highly satisfactory in commercial use, the original graders for carrying on the process, did not provide sufficient flexibility in operation in order to meet various operating conditions. For instance, it occasionally happens, at least temporarily, that the run of peas is either so good or so inferior, that quality grading is superfluous, thereby making it desirable to by-pass the grader, and thus reduce the cost of treatment. Then too, it is desirable, in order to secure most effective quality grading, to maintain the grading liquid free from impurities, such as pods and thistle buds. It is moreover desirable, dependent upon the characteristics of the peas being treated, to vary the relative velocities of the separating streams, such velocity variations also being desirable in order to alter the nature of the final grades.

It is a more specific object of the present invention to provide various improvements in the details of construction of quality graders of the general type above described, which will permit attainment of the desirable results referred to, and which will also

enhance the efficiency of operation of such devices.

Some of the novel features of quality grader construction and operation, including the method of utilizing superimposed streams of separating liquid flowing in the same direction as described but not specifically claimed herein form the subject of said copending application Serial No. 413,507, filed December 12, 1929.

A clear conception of embodiments of the various novel features constituting the present invention, and of the mode of constructing and of operating quality graders built in accordance therewith, may be had by referring to the drawing accompanying and forming part of this specification, in which like reference characters designate the same or similar parts in the various views.

Fig. 1 is a central vertical section through the separating chambers of a quality grader, showing some of the improvements in elevation;

Fig. 2 is an enlarged fragmentary central vertical section through the brine supply tank of the quality grader; and

Fig. 3 is a fragmentary part-sectional top view through the brine supply tank, the section being taken along the irregular line 3-3 of Fig. 2, looking in the direction of the arrows.

The improved quality grader specifically disclosed in the drawing by way of illustration, comprises in general a brine supply tank 5 supported upon a main frame 4 and communicating at one end with the corresponding ends of several groups of casings which are also supported upon the main frame 4. Each of the groups of casings comprises a series of three superimposed chambers or channels communicating directly with the supply tank 5 and formed to produce the requisite three superimposed horizontally advancing streams.

The intermediate chamber 6 of each of the groups, communicates with the medial portion of the tank 5 through an expanding inlet portion 29, and the chamber 6 has a relatively large cross-section, thereby producing relatively slow advancement of the

brine therethrough. The upper channel 7 of each group is in open communication along its bottom, with the adjoining chamber 6, and has one end 25 in direct communication with the upper portion of the tank 5, and its opposite end in open communication with a discharge trough 9 over a vertically adjustable dam or wier 30. The lower channel or pipe 8 of each group, has its upper portion in open communication with the adjoining chamber 6 by virtue of a slot 31, one end of the pipe 8 communicating directly with the lower portion of the tank 5, and the opposite end thereof communicating with a discharge trough 12 through an inclined pipe section 10. The discharge troughs 9, 12 are disposed laterally adjacent to each other and have no inter-communication other than through the end of the chamber 6, as clearly illustrated in said copending application.

The discharge troughs 9, 12 are adapted to conduct material delivered thereto over independent inclined discharge grids 11, each grid 11 serving to accommodate the discharge from several of the grading units.

Disposed beneath the discharge grids 11 is a brine receiving tank 13, the upper inlet portion of which is provided with removable screens 14 for catching the pods and thistle buds delivered through the grids 11 with the separated brine. These screens 14 may be readily removed for cleaning purposes. A circulating pump 15 has its suction 16 connected with the lower portion of the tank 13, and is provided with a flexible discharge pipe 17 which communicates with a supply pipe 18 for the tank 5. The end of the supply pipe 18 within the tank 5, is provided with a perforated header 19 for injecting the brine into the tank 5 without undesirable agitation.

The headers 19 may be formed of any suitable length in order to secure uniform distribution of the brine within the tank 5, and as shown in detail in Figs. 2 and 3, each header 19 may be provided with relatively small outlet pipes 26 communicating with the upper portion thereof. The outlet pipes 26 extend upwardly into the tank 5 and are provided with control valves 27, being subsequently directed downwardly and terminating in nozzle portions 28 which are directed into the inlet ends of the pipes 8. By admitting liquid under pressure directly from the headers 19 into the inlet ends of the pipes 8, the velocity of flow through these pipes may be materially augmented, the nozzle portions 28 producing ejector actions and thereby causing the flow to be intensified.

The mixed peas are admitted to the quality graders through a supply hopper 20 having lower portions 24 for admitting the peas directly into the chambers 6 beneath the channels 7. The peas are conducted into

the hopper 20 by means of a bucket elevator 22, the successive buckets of which deliver batches of peas into the upper end of the hopper 20, from whence they gravitate downwardly through the lower hopper portions 24.

In accordance with the present invention, an auxiliary spout or by-pass chute 21, which is formed to conduct the peas discharged by the elevator 22 into the upper end of the hopper 20, past the grader units without subjecting the peas to grading, is provided. In order to permit such use of the chute 21, a pivotally supported by-pass gate 23 is provided, and it will be apparent that by setting the gate 23 as indicated in Fig. 1, the peas delivered from the bucket elevator 22 will be caused to travel downwardly through the chute 21. If the gate 23 is swung about the hinge at its lower end in a clockwise direction, as viewed in Fig. 1, the peas delivered from the elevator 22 will be discharged downwardly through the hopper 20 and cannot enter the chute 21.

During normal operation of the improved grader, and assuming the by-pass valve 23 to be swung forwardly so as to cut off the chute 21, the admitted peas are delivered by gravity through the hopper 20 and hopper portions 24 directly to the separating chambers 6. The mixed peas thus admitted are carried longitudinally within the chamber 6 by the brine passing slowly therethrough, and during such transportation of the mixture, the floaters rise into the channel 7 and the sinkers drop into the pipes 8. Due to the relatively higher velocities in the channels 7 and pipes 8, the floaters and sinkers are quickly discharged into the troughs 9, 12 respectively, and are subsequently separated from the conveying liquid by the grids 11 and are discharged from the machine. As the stream of liquid within each chamber 6 approaches the discharge end of the chamber, there remain in suspension a certain number of balanced peas, the specific gravity of which is such that they will neither float nor sink in the brine. These peas may be caused to accept either the channel 7 or the pipe 8, as a means of discharge, either by varying the height of the wier 30, or by varying the velocity of flow through the pipe 8. Variation in the velocity within the pipes 8 may be readily effected by manipulating the valves 27 to thereby increase or diminish the velocity of the streams within the pipes 8. When the velocity within the pipes 8 is increased, there will be a tendency due to the increased velocity, for the liquid flowing through the discharge portions 10 to withdraw more peas and liquid from the discharge ends of the chamber 6, thus providing conveniently operable means for establishing a wide range in the operating conditions of the grader units.

If it becomes desirable, due to the characteristics of the peas transported by the elevator 22, to by-pass the grader units, it is only necessary to manipulate the by-pass gate 23, thus effectively cutting out the graders. The screens 14 serve to effectively remove the pods, thistle buds, and other impurities which pass through the grids 11, thus maintaining the brine in suitable condition for subsequent use in the separating chamber.

From the foregoing description, it will be apparent that the present invention greatly enhances the flexibility of operation of grading units of this general type. The pipes 26 and valves 27 permit convenient variation in the characteristics of the quality grades produced. The by-pass chute 21 and gate 23 permit convenient discharge of the peas past grader units whenever such by-passing becomes desirable. The discharge end of the by-pass chute 21 is preferably formed so that the material passing through the chute may be delivered to any desired place in accordance with the will of the operator. The screens 14 provide simple and effective means for maintaining the separating liquid in relatively pure condition, and the various improvements constituting the present invention have cooperated to greatly increase the efficiency and commercial value of these quality graders.

It should be understood that it is not desired to limit the invention to the exact details of construction herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In combination, means for producing three superimposed horizontal streams of liquid emanating from a common source and flowing in the same direction, means for delivering granular material only into the intermediate of said streams to effect rising of the lighter granules into the upper of said streams and settling of the heavier granules into the lower of said streams, and means for injecting liquid at high velocity directly into an end of the lower of said streams longitudinally thereof.

2. In combination, means for producing superimposed horizontal streams of liquid, means for delivering granular material into an upper of said streams between the ends of the lower of said streams to effect quality grading of the granules, means associated with one end of the lower of said streams at one side of said delivery means for elevating the granules transported by said lower stream, and means at the opposite end of said lower stream and at the opposite side of said delivery means for augmenting the

velocity thereof to effect elevation of the material at the other end thereof.

3. In combination, means for producing three superimposed horizontal streams of liquid, said means including a common supply tank and conduits communicating with said tank, means for delivering granular material only into the intermediate of said streams beyond said tank, and means for injecting liquid at relatively high pressure into the lower of said streams to eject liquid from said tank through the lower of said conduits.

4. In combination, a liquid supply tank, three superimposed conduits communicating with said tank, means for delivering granular material into the intermediate of said conduits beyond said tank, a header for delivering liquid into said tank remote from said conduits, and a valve controlled pipe for injecting liquid from said header directly into the lower of said conduits.

5. In combination, a liquid receptacle, a plurality of conduits communicating with said receptacle, means for delivering granular material into the stream of liquid emanating from one of said conduits, means for supplying liquid to said receptacle remote from said conduits, and a pipe for injecting liquid from said supply means directly through another of said conduits.

6. In combination, a liquid receptacle, a plurality of conduits for delivering superimposed streams of liquid from said receptacle, means for depositing granular material into an upper of said streams, means for distributively supplying liquid to said receptacle remote from said conduits, and a valve controlled pipe for delivering liquid at comparatively high pressure directly from said supply means into the lower of said conduits.

7. In combination, a liquid receptacle, three conduits for delivering superimposed streams of liquid from said receptacle, means for depositing granular material directly into the intermediate of said streams outside of said receptacle, a header for distributively delivering liquid to a medial portion of said receptacle remote from said conduits, a pipe connecting said header directly with the lower of said conduits, and a valve for controlling the flow of liquid through said pipe, said valve being operable from the top of said receptacle.

8. In combination, grading apparatus comprising an elongated separating chamber having a quality grade delivery grid at one end thereof, a hopper for delivering granular material requiring grading to said chamber remote from said grid, an elevator for admitting material to the upper end of said hopper, a chute directly connecting the portion of said hopper in proximity to the delivery end of said elevator with said grid,

and a deflector gate movably associated with
the end of said chute adjoining said hopper,
said gate being adjustable to by-pass mate-
rial from said elevator past said hopper to
5 said chute.

In testimony whereof, I affix my signature.

FRANK D. CHAPMAN.

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