March 4, 1969 S. G. HENSLEY 3,430,764

FLOTATION SEPARATOR FOR PEPPER CORES AND MEATS

Filed Oct. 31, 1967 Sheet 1 of 2

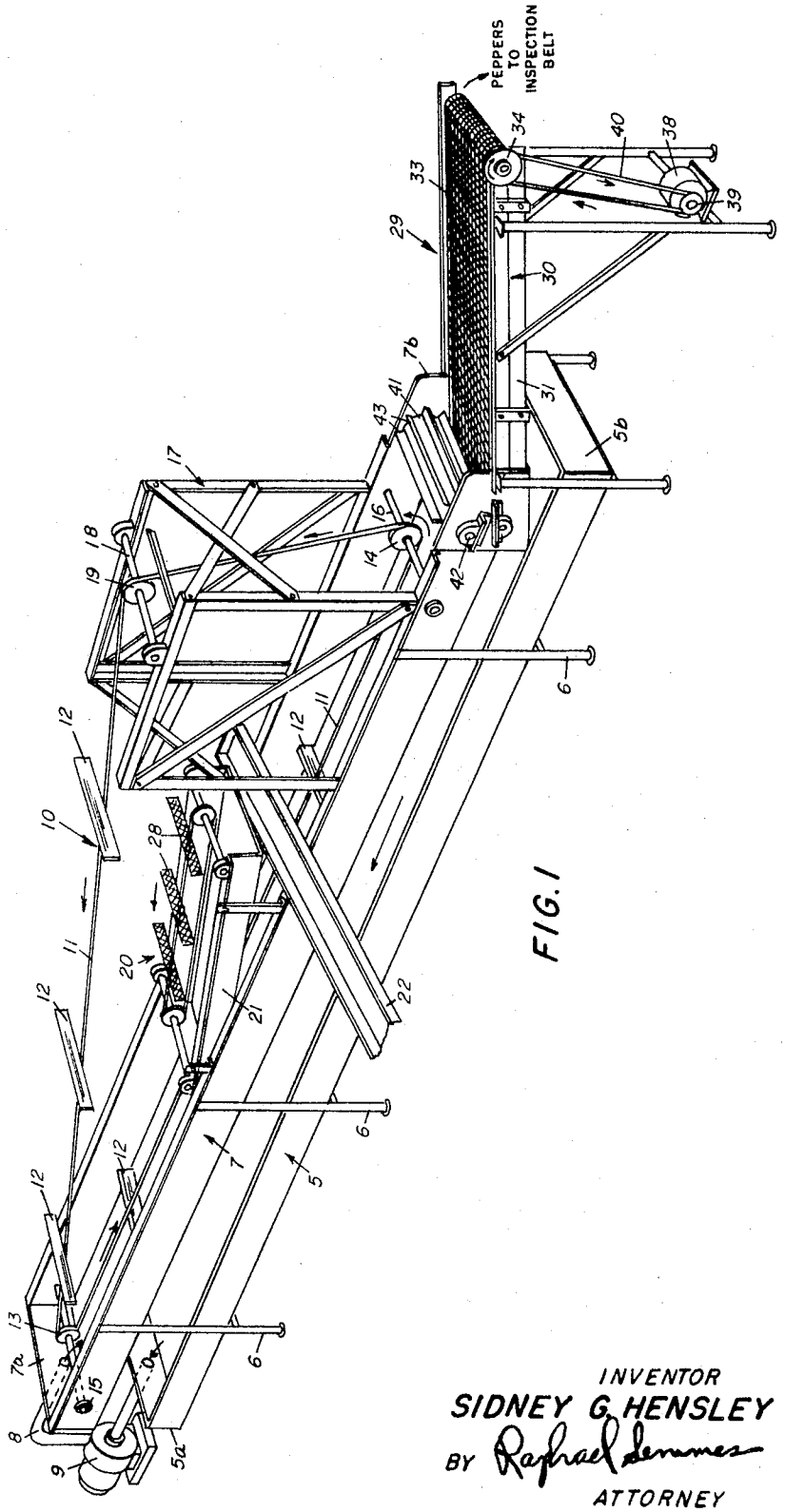


FIG. 1

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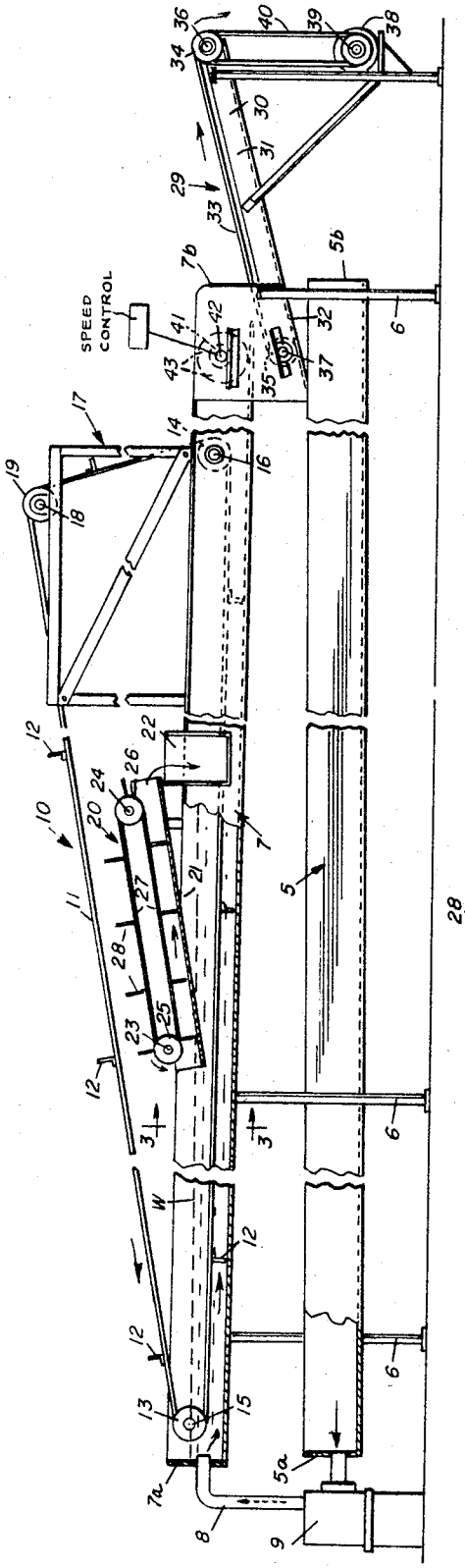


FIG. 2

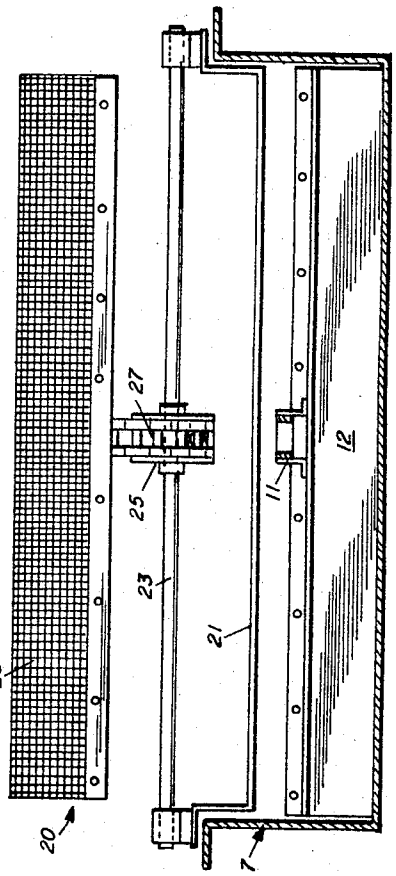


FIG. 3

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United States Patent Office 3,430,764
Patented Mar. 4, 1969

3,430,764

FLOTATION SEPARATOR FOR PEPPER CORES AND MEATS

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Filed Oct. 31, 1967, Ser. No. 679,333
U.S. Cl. 209—10 8 Claims
Int. Cl. B03b 11/00, 3/38

ABSTRACT OF THE DISCLOSURE

Apparatus for automatically separating the cores from the meats of pepper pods by a flotation system having an elongated, inclined water reservoir surmounted by an elongated, oppositely inclined flotation trough, the elevated end of which communicates with the lower end of the reservoir through a passageway having a water circulating pump. Crushed peppers are fed to the elevated end of the flotation trough where the cores float on the water and the meats sink to the bottom, due to their greater density. This flotation trough is provided intermediate its ends with an endless chain drag conveyor mounted on an incline and designed to intercept and discharge the floating cores. The sunken meats are transported along the bottom of the flotation trough towards its discharge end by a second drag conveyor or feed regulator extending from end to end of the trough with its operative run passing beneath the first drag conveyor. Extending across its discharge end, the flotation trough is provided with a water level regulator consisting of a rotary cylinder having a plurality of radial flights discharging the meats onto an endless, inclined, perforated dewatering conveyor which collects the meats for inspection and returns the water to the reservoir for recirculation.

Background of invention

Conventionally, pepper meats are separated from their cores by a tedious, manual operation which is not only expensive but time-consuming. Although numerous flotation systems have been developed for separating products of different densities, such as nut meats from shells, none of the mechanisms of these systems are practical for the separation of pepper meats from their cores. Examples of these known structures are shown in Patents 2,216,050, 2,241,737, 2,530,676, 2,976,992 and 3,249,219.

It is therefore the primary object of the present invention to provide an apparatus embodying a flotation system which is especiallly adapted to separate the cores and meats of peppers mechanically instead of manually and to thereby reduce labor costs and time.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel features herein set forth, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

The drawings

Referring to the drawings in which numerals of like character designate similar parts throughout the several views:

FIG. 1 is an isometric view of the apparatus of the invention;

FIG. 2 is a view in side elevation with certain parts shown in section; and

FIG. 3 is an enlarged, transverse, sectional view taken on line 3—3 of FIG. 2.

At the outset, it may be pointed out that the apparatus of this invnetion is designed for handling peppers which have first been broken apart by a pepper mill or crusher

in order to initially disengage the cores from the meat of the fruit. The particular flotation system employed takes advantage of the discovery that pepper meats will sink with the core removed, and the core by itself will float, due to the differences in density.

In the drawings, 5 represents an elongated steel tank or reservoir mounted on a series of upstanding legs 6 and downwardly inclined from its forward end 5*b* to its discharge end 5*a*. Overlying the reservoir 5 and spaced vertically therefrom is a flotation trough or flume 7 which is oppositely inclined with respect to the reservoir, that is, downwardly inclined from its aft or feeding end 7*a* to its forward or discharge end 7*b*, said flotation trough being also supported by the legs 6. A recirculation conduit 8 having a pump 9 connects the discharge end 5*a* of the reservoir to the inlet end 7*a* of the flotation trough so that water from the reservoir is recirculated through the flotation trough, as will later appear.

A pepper feed regulator, generally indicated by the numeral 10, extends substantially from end to end of the flotation trough and preferably consists of an endless roller chain 11 carrying a series of laterally disposed, longitudinally spaced, rubber cross-flights 12. The chain 11 passes over a pair of lower sprockets 13 and 14, rotatably supported on shafts 15 and 16 respectively, mounted in suitable bushings in the side walls of the flotation trough, the sprockets being disposed on the longitudinal center of the trough and vertically spaced from the bottom of the latter so that in operation the flights 12 successively pass along and slidably engage the bottom of the trough. An elevated, vertical frame 17, supported on the upper edges of the side walls of the trough adjacent its forward end, supports a transverse shaft 18 on which is rotatably mounted a third sprocket 19 which is aligned with respect to the sprockets 13 and 14 so as to support the upper run of the roller chain 11 in elevated position.

As best seen in FIG. 2, the vertical spacing of the upper sprocket 19 with respect to the lower sprockets 13 and 14 is such that the endless chain 11 of the feed regulator 10 follows a substantially triangular path of travel, with its upper run downwardly inclined toward the aft end 7*a* of the trough so as to provide a clearance intermediate the longitudinal extremities of the trough to accommodate a core separator conveyor, generally indicated by the numeral 20. This core separator comprises a forwardly and upwardly inclined drag pan 21, the lower end of which is submerged below the water level W in the trough 7 and spaced slightly above the lower run of the feed regulator conveyor 10, its opposite or elevated end being arranged to feed into a core discharge conveyor 22. Mounted between opposite ends of the side walls of the drag pan 21 are a pair of shafts 23 and 24, carrying sprockets 25 and 26 respectively, over which a centrally located, endless roller chain 27 passes. A series of wire cloth strips 28 of a length corresponding substantially to the width of the drag pan 21 are supported transversely on the roller chain 27, and the depth of these strips is such that as the endless chain 27 passes over the sprockets 25 and 26 in a counterclockwise path, the strips on the lower run of the conveyor engage the bottom of the drag pan 21.

Although not shown in the drawings, any suitable drive means may be employed for operating the feed regulator conveyor 10 and the core separator conveyor 20 at coordinated speeds of advance, with the conveyors of both units advancing in counterclockwise direction, as viewed in FIG. 2, so that the flights 12 of the feed regulator advance the meats of the peppers forwardly along the bottom of the trough 7, and the strips 28 of the core separator intercept the floating cores and advance them upwardly in the drag pan 21 for delivery into the discharge

conveyor 22, all as will later appear. Preferably, the same motor (not shown) drives both the feed regulator 10 and the core separator 20.

Adjacent the forward or discharge end 7*b* of the flotation trough 7, which as seen in FIG. 1 is open, I provide a dewatering unit generally indicated by the numeral 29. This unit comprises a drain pan 30 having upstanding side walls 31 mounted adjacent the open end 7*b* of the flotation trough. This drain pan is forwardly and upwardly inclined with respect to the trough 7, and its bottom is extended as at 32 to discharge water into the forward end 5*b* of the reservoir 5. The pan 30, including its side walls 31, is downwardly offset with respect to the discharge end 7*b* of the trough 7, so that the lower end of the pan is below the bottom of the trough 7.

A screen conveyor 33 passes over suitable rollers extending across opposite ends of the drain pan 30 between the side walls 31 thereof. A shaft 36, supported at the discharge end of the pan 30, carries a driven sprocket 34, while the shaft 37 at the opposite end of the pan carries an idler sprocket 35. A suitable motor 38 having a drive sprocket 39 actuates the driven sprocket 34 through the medium of a sprocket chain 40, so that the endless screen conveyor 33 is caused to travel in clockwise direction in the pan 30. The sprocket and shaft 35, 37 are suitably mounted for adjustment to take up slack in the screen conveyor 33.

Extending across the open discharge end 7*b* of the flotation trough 7 a cylinder 41 is mounted on a shaft 42, supported between the side walls of the trough, and the periphery of the cylinder is provided with a series of radially projecting, thick rubber flights 43. Thus, the cylinder and flights provide a flutter wheel which is powered by a suitable motor (not shown), arranged to rotate the cylinder in counterclockwise direction. This flutter wheel serves the dual purpose of delivering the meats of the peppers onto the dewatering conveyor 33 from the bottom of the flotation trough 7, and, also, due to the fact that the outer edges of the thick rubber flights 43 slidably engage the bottom of the trough 7 and extend entirely across the side walls thereof, it acts as a regulator for the level of water maintained in the trough. In other words, the flutter wheel acts as a barricade at the open end of the trough, and by controlling the speed of its rotation, the amount of water discharged from the trough for recirculation may be controlled to regulate the level of water in the trough.

Operation

In operation, peppers are first broken apart by a pepper mill or crusher (not shown) in order to separate the cores from the meat of the fruit, and this product, both meat and cores, is run through a seed reel (not shown) to remove the seed, and it is then deposited in the trough 7 at its elevated end 7*a*, the trough 7, as well as the reservoir 5, having been previously filled with water to the desired level.

Due to the lesser density of the cores, they tend to float to the top of the water, while the meats of the peppers, which are of greater density, tend to sink to the bottom of the trough. The cores are carried by the current of the moving water, which is being constantly recirculated, to the core separator unit 20, where the counterclockwise travel of the conveyor 27 and flights 28 intercept and pull the cores up the drag pan 21 and deposit them in the core discharge conveyor 22. The inlet end of the pan 21 is preferably submerged approximately two inches in the water in trough 7 to facilitate the trapping of the floating cores.

The recirculating water is fed into the elevated end 7*a* of trough 7 at the rate of 175–200 gallons per minute, and due to the current supplied by the inclination of the trough 7 and the amount of water fed constantly to the trough, supplemented by the counterclockwise movement of the cross-flights 12 on chain 11, the floating pepper cores are caused to continuously advance to the inlet end of the core separator 20 for removal from the system.

Simultaneously, the sunken meats of the peppers are advanced along the bottom of the trough 7 by the endless conveyor 11 and cross-flights 12 so that they are caused to pass beneath the floating cores and are delivered to the flutter wheel 41. Here, the meats are engaged by the counterclockwise traveling flights 43 of the flutter wheel and deposited on the lower end of the clockwise traveling screen conveyor 33. As they are conveyed upwardly in the drain pan 30 by the screen conveyor 33, the water is drained therefrom into the pan. The water is then returned by the lower end 32 of the pan to reservoir 5 for recirculation through the trough 7 by means of pump 9 and conduit 8. The drained peppers are dropped off of the forward end of the screen conveyor 33 and colected by any suitable means.

It will be apparent that the apparatus of the present invention is of maximum simplicity and provides a system of separation which results in a minimum of damage to the product. The operation is continuous and may be easily regulated to control the desired production.

From the foregoing, it is believed that the invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details disclosed without departing from the spirit of the invention as set forth in the following claims.

I claim:

1. Floatation apparatus for separating the meats and cores of peppers, comprising an elongated flotation trough having inlet and discharge ends, surmounting a water reservoir, means for continously circulating water from said reservoir to the inlet end of said trough, said water-containing trough being adapted to receive crushed peppers with their meats and cores mixed but disengaged, whereby due to the differences in their densities, the cores float and the meats sink in said trough, means for causing an advancing current of water to travel from the inlet to the discharge end of said trough, a core separator intermediate the ends of said trough having its inlet end submerged in said water to intercept said floating cores and remove them from the trough, means for continuously advancing said sunken meats along said trough beneath said core separator, a dewatering unit adjacent the discharge end of said trough for draining the discharged pepper meats, and a water level regulator means adjacent the discharge end of said trough for controlling the volume of water discharged therefrom and returned to said reservoir for recirculation and for facilitating the advance of pepper meats to said dewatering unit.

2. Apparatus as claimed in claim 1, wherein said flotation trough is downwardly inclined from its inlet end to its discharge end to produce a constantly advancing current of water from said inlet end to said discharge end of said trough.

3. Apparatus as claimed in claim 2, wherein said reservoir is oppositely inclined with respect to said trough, said water circulating means comprising a conduit connecting the lowered end of said reservoir to the elevated end of said trough, and a circulating pump in said conduit.

4. Apparatus as claimed in claim 1, wherein said core separator comprises a forwardly and upwardly inclined drag pan having its lower end submerged in the water in said trough, an endless conveyor for advancing intercepted cores upwardly in said drag pan, and discharge means adjacent the discharge end of said core separator for removing the separated cores from the system.

5. Apparatus as claimed in claim 4, wherein said endless conveyor is provided with a series of transversely disposed wire cloth strips for intercepting and advancing the floating cores upwardly in said drag pan.

6. Apparatus as claimed in claim 1, wherein said means for advancing said sunken meats along said trough comprises an endless conveyor provided with a series of longitudinally spaced, laterally disposed cross-flights, said endless conveyor passing over sprockets adjacent opposite ends of said trough and spaced vertically from the bottom of the latter so as to present the lower run of said cross-flights for sliding engagement with the bottom of said trough.

7. Apparatus as claimed in claim 1, wherein the discharge end of said trough is open, and said dewatering unit comprises a drain pan communicating with said open end of said said trough and forwardly and upwardly inclined therefrom, and an endless screen conveyor arranged with its upper run in line with the bottom of the open end of said trough, the bottom of said drain pan being extended at its lower end for returning drained water to said reservoir for recirculation.

8. Apparatus as claimed in claim 7, wherein said water

level regulator comprises a flutter wheel having a series of radial flights of resilient material, mounted for rotation between the walls of said trough barricading its open end, and means for controlling the speed of rotation of said flutter wheel for regulating the volume of water discharged through said open end to said dewatering device for recirculation.

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U.S. Cl. X.R.

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