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VEGETABLE PULPER AND JUICER

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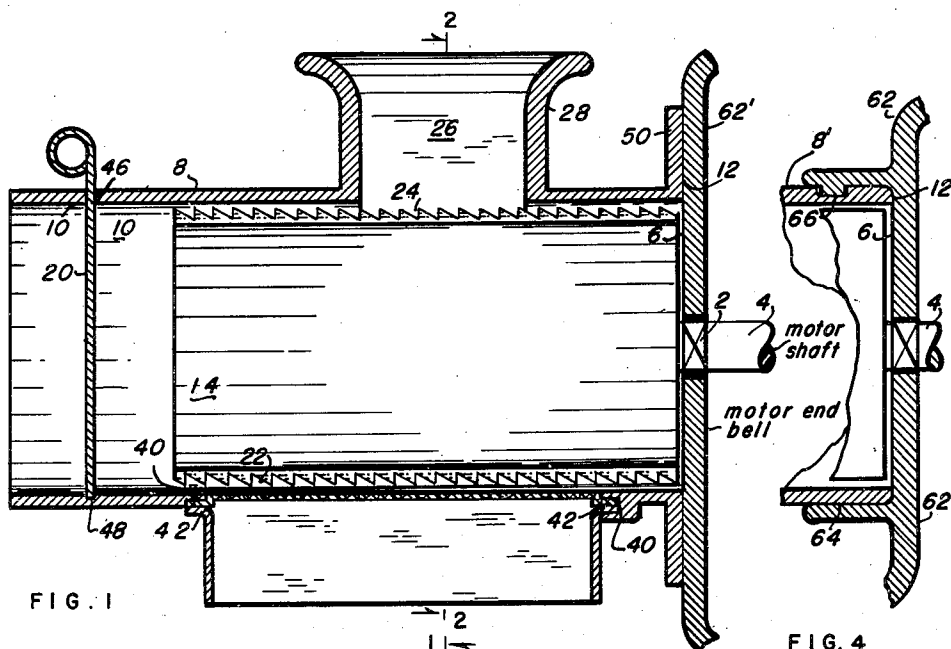


FIG. 1

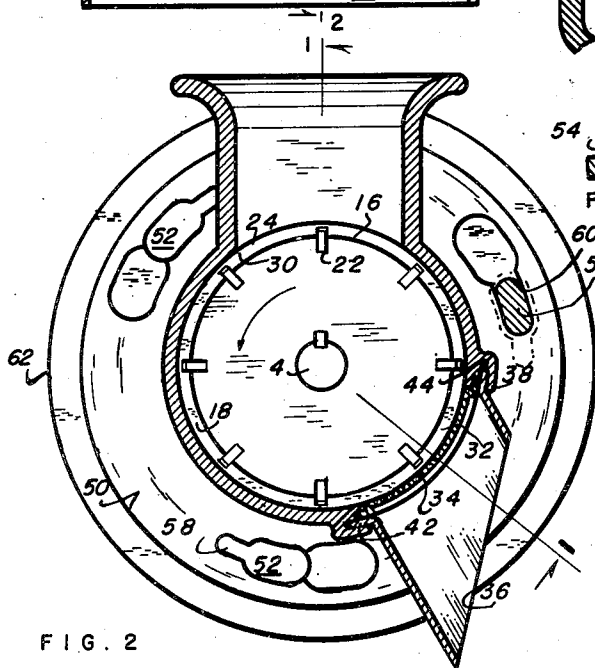


FIG. 2

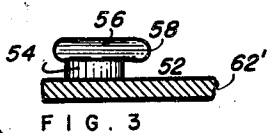


FIG. 3

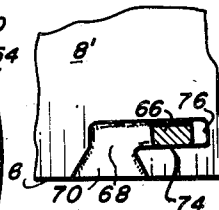


FIG. 4

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VEGETABLE PULPER AND JUICER

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8 Claims. (Cl. 146—123)

This invention is concerned with the conversion of vegetables and the like from the natural or solid state to pulps and/or juices, and provides improvements upon my invention described in my patent for a Fruit and vegetable shredder, No. 2,214,075, issued September 10, 1940.

It is the principal object of my present invention to extend the utility of the patented machine, so that it may be employed not only to reduce vegetables to an unseparated state of the pulp and juice as before, but either to separate the juice from the pulp or not as one may elect, and, moreover, to do this with a maximum degree of facility, employing the while a minimum complication of apparatus.

An additional object of this invention is to so provide that the apparatus is easily cleaned, and to this end that the same may be disassembled after use, without the aid of tools, etc., so that the housing may be washed and sterilized with a minimum of exertion.

Another object of the invention is to utilize a minimum of distinct parts in the constructional detail, multiplying the functions of each distinct part and thus eliminating parts previously employed.

A further object of the invention is to minimize recesses capable of accumulating organic matter, and where such recesses are retained, to make them readily accessible for scrubbing.

It is another object of this invention to provide for the equalization of forces acting upon the motor shaft insofar as it is possible to do so.

It is still a further object of this invention to avoid, insofar as possible to do so, the contamination of foods processed by metal, and to this end the machine is constructed, so far as possible, from non-metallic materials, such as moldable plastics.

It is another object of this invention to minimize the cost of the machine, and to this end the cutting elements are sections of saw blades of the hacksaw variety.

Another object of the invention is to provide for the pulping and the separation of the fluid and fiber as a continuous process and to provide for the discharge of both by the same means through different spouts or the same spout.

It is another object of the invention to make the housing of the cutting rotor simple and at the same time provide that its axis shall not vary from its correct relation to the rotor shaft axis, which, in the present embodiment, is coincident with the rotor shaft axis.

In the drawing:

Figure 1 is a vertical section of that portion of my machine which modifies my previously patented disclosure, the rotor being shown without sectioning and without all blades in this figure, and the section being approximately as along the irregular line 1—1 of Figure 2;

Figure 2 is a section through the housing and separator sieve without cutting through the rotor, as about at line 2—2 of Figure 1;

Figure 3 is a fragmentary side elevation of a bayonet lug employed in the self tightening connection of the modification of Figures 1 and 2; and

Figures 4 and 5 are fragmentary sectional details of arrangements for fastening an improved modification of the machine and its parts together.

A motor housing end bell 62 has a sealed bearing 2 as a fixture thereof to support the motor shaft 4 and seal the same against passage of materials along the shaft therethrough, cooperating with a second like bearing at another point in the motor housing, as well understood, to position the shaft axis with reference to the housing. The bell 62 provides a flat exterior face 6 defining a plane at right angles or normal to the shaft axis.

A demountable processing housing member 8, directly engageable with the face of the motor in one of the ways to be described, is, preferably, formed of plane tubing having a true cylindrical bore 10 extending from end to end of housing member 8 and said housing member 8 terminates at one end 12 in a plane at right angles to the axis of the bore 10, so that, by simply engaging the end of the housing with the face 12 of the motor, the axis of the bore 10 lies parallel with the axis of shaft 4.

The housing 8 is preferably of generally cylindrical exterior concentric upon the bore 10, so that this portion may be selected from among standard sizes of tubing, either of metal or of non-metallic materials such as Bakelite, if so desired, in this way reducing the cost of making the housing in small quantities.

In the operative position, the housing 8 surrounds the rotor 14 which may, in form, be of like construction to that of my cited patent, or of a solid right cylinder of non-metallic material such as Bakelite, axially concentrically fixed upon the motor shaft and having its cylindrical surface 16 lying quite close to the confining surrounding cylindrical surface of the bore 10. It is preferable that the rotor occupy the bulk of the cross sectional area of the bore 10 leaving the small tubu-

lar clearance 18 between the juxtaposed surfaces of the rotor and the housing bore and that the rotor shall extend a substantial distance along the axis of the bore, as illustrated, to a point relatively near a gate 20 which is adapted to entirely close the bore 10, and occupy the space very close upon but clearing the face 6 of the motor housing end bell 62. Accordingly, the volume of free space within the housing 8 is quite limited when the gate 20 closes the free end of the bore 10. Of course, if desired, the rotor may be made up of a hollow cylindrical body which is impermeate, if desired.

The saw blades 22 of the rotor are mounted in axially disposed slots in rotor 14 so that the points of the teeth lie in a substantially straight line and in the same plane wherefore an ordinary flat hacksaw blade may be employed. The alignment of the saw teeth tips is likewise parallel to the rotor axis and falls just short of the surface of the bore 10 under maximum conditions of rotor gyration, to avoid damage to the bore through direct abrasion by the saw teeth. Near the motor end, or face 12, the housing 8 has an intake port 24 of preferably rectangular cross section and to which a like straight uniformly sectioned duct 26 of an elongate hopper 28 is adapted to guide vegetables to be processed. The length of the throat or duct 26 of the hopper is preferably sufficient to prevent an operator's fingers from reaching the rotor blades. A natural disposition of the parts is preferred, that is, the rotor is horizontal, and the hopper and spout feed down, with the separated pulp feeding to the gate 20.

The hopper is preferably formed of the same material as the housing 8 and is integrated therewith as indicated, in the manner conventional to the method of construction. The rectangular throat is provided in order to present a straight line juncture with the bore 10 along an axial element 30 which forms a shearing juncture and does not tend to contract the material in process to a central zone on the rotor.

The rotor is driven at a high rate of speed and the blades engaging material pressed against the cylindrical surface of the rotor, gouge out furrows of the vegetable, pushing it the while before the blade into the confined cylindrical space 18 between the rotor and the bore 10. The surface of the rotor itself prevents a too thick cut, giving preferment to relatively shallow scratchings of the material worked upon so as to tear fibers and cells apart. The comminution of the fibers is very likely largely achieved upon the first engagement, but the frictional drag of bore wall 10 may cause portions of the material to slip by successive blades and be abraded further in the process.

The high speed of the rotor 14 causes a high centrifugal acceleration of the pulp and a consequent hydraulic pressure which causes the material to move either longitudinally or radially wherever there is release. In my previous patent I employed the centrifugal action alone, providing no means of separation of the pure liquid from the pure pulp. By placing an outlet 32 in the housing, preferably in the direction of gravity from the hopper and somewhat circumferentially from the bottom of the bore and radially from the rotor, the unrefined product was thrown out of the housing, and, if only the juice or the pulp was desired, separate steps were taken to separate them.

By this invention I place a strainer, or sieve 34 across the outlet 32, and this strainer prefer-

ably presents its inner surface as a continuation of the bore 10 so that the material is either pushed across its interior surface by the blades, or forced through the sieve 34. The sieve 34 may be of wire cloth, or any more or less discriminating material, depending upon the degree of separation desired. With the sieve in place as illustrated, there is a pressure built up on the pulp which forces it to move endwise since it cannot move through the outlet 32, the aggregate direction of movement being toward gate 20. This gate may be kept closed until an accumulation of pulp is had within the housing. By so doing it is churned and agitated and the pressure builds up to such an extent that the liquid is more thoroughly expressed. When the gate 20 is opened the pulp is driven through the end of the bore incident the pressure developed around the rotor. The sieve may be elongated with the rotor length, to give greater opportunity for centrifuging.

The sieve 34 is separable from the housing, as is the spout 36, having a seating rim slidable into the groove of an open-ended U-shaped slot formed in the edge flange 38 of the rectangular outlet 32, said rim dropping into a seat 40 in the tubular member 8 proper, and being held to said seat by the flange 42 of the detachable spout 36 which slides in endwise, the said flange 42 being concentric to fit the outer surface of the housing 8, and having a greater circumferential spread than the seat 40, so that the screen may be omitted and the spout still is fixed in place by its own dovetail groove 44.

The disposition of the outlet 32 is such that the developed fluid pressure below the rotor tends to overcome the pressure of material against the rotor at the hopper.

The gate 20 is preferably of a disc shape of greater diameter than the diameter of the bore 10, and less than the external diameter of the housing 8, the housing being cut from the top or side to pass the diameter and thickness of the same as at 46, and the remainder of the housing bore being grooved as at 48 to engage the inner circumference of the disc. This groove can be cleaned with a simple brush, and the disc can be kept clean with ease.

Two types of fastenings are illustrated, each with its advantages. In Figures 1, 2, and 3, the end face 12 of the housing 8 is extended by an integral flange 50. Lugs 52 having circumferentially elongated necks 54 topped by flat heads 56 with preferably trailing fingers 58 are secured equidistantly from the motor axis on the face 6 of the motor housing. The flange 50 is provided with matching openings for said lugs, to pass the lug, its head, and finger, and permit rotation of the flange so that the small portion 60 of the flange opening, which has concentric sides to fit the concentric sides 62 of neck 54, fits against the sides of the neck and centralizes the bore 10 on the axis of the shaft. The head 56 takes upon the outside of the flange to press the face 12 against face 6, and the finger 58 may be somewhat resilient to assist in this function. The direction of the rotor rotation is so selected that the tendency is for the housing to pull the slot 60 against the neck 54 of the lug. This modification is desirable where flange 50 can be easily made and/or where it is inconvenient to provide other than for the face 6 of the motor end bell.

In Figures 4 and 5, the end bell 62 of the motor is provided with a shaft-concentric interiorly cylindrical flange surface 64 having short rela-

tively large square or rectangular bayonet lugs 66 adapted to slide into grooves in the interior concentric surface of housing 8'. Groove 68 provides a flared entry 70 whose thrust wall 74 has a helical pitch away from the end 12 toward slot end 76, so that rotation in the direction of the rotor causes the end 12 to thrust against the normal face 6. By this construction the interior of the bore 10 is continuous to the motor face, and materials are free to move toward the open end of the bore, and cleaning is a simple task.

Consumers of raw vegetables purchasing the beverage prefer that it be processed just before drinking. Some require it strained, others unstrained. This invention provides for quickly modifying the apparatus for either purpose.

The apparatus can be employed to generate pastes of meats and the like, and to this end, a metallic plate may replace the screen 34 to entirely close the port 32. The meat is fed into the closed rotor chamber and forms into a paste which may be driven off by simply opening the gate 20.

I claim:

1. In a device of the character described, a stationary wall member, a motor driven shaft supported by said wall for rotation and projecting therefrom, a tubular housing member having a terminal end, means on said wall and means on said housing terminal end whereby said tubular member is detachably fastenable with its axis parallel to the axis of the shaft, said tubular housing being open ended and adapted to have one end closed by said wall member when so fastened, means separable from said housing member for closing the other end of said housing member, inlet and outlet ports formed radially through the walls of said housing member, a rotor substantially filling said housing member leaving clearance therebetween and the housing interior, blades in said rotor having teeth projecting into said clearance short of said housing member and disposed to pass said ports, a sieve detachably fastenable across the outlet port, and means whereby said housing and said sieve may be manipulated for their fastening without the aid of tools.

2. A device according to claim 1, said tubular member being internally cylindrical concentric upon the shaft axis and said rotor being externally cylindrical and concentric upon the shaft axis and providing a limited clearance therebetween and said tubular member, said sieve being arcuate and mounted concentric upon the

rotor to clear the teeth thereof and substantially in continuation of the internal cylindrical surface of said tubular member.

3. A device according to claim 1, said first named fastening means comprising connections whereby the pull of the rotor on the housing tends to tighten the fastening.

4. A device according to claim 1, the closure for said open end comprising a disc, and said housing providing a slot and groove for the reception of said disc to close the same.

5. A device according to claim 1, said housing providing a hopper integral therewith and feeding to said inlet port and onto said rotor, and said housing providing a seat for said sieve surrounding said outlet port and a grooved flange adjacent said seat, and a spout having a flange adapted to fit within said grooved flange to hold said sieve to its seat.

6. A device according to claim 1, said wall member and said terminal ends having respectively, engageable faces in planes at right angles to the shaft axis and the housing member axis, and further having the fastening means of the bayonet type whereby upon engagement of the said engageable faces the axis of the housing and shaft coincide.

7. In a device of the character described; a housing member having a uniform interior cylindrical bore extending entirely therethrough; a rectangular hopper opening radially through the wall upon said bore; a second opening through the wall of said housing, a sieve secured across the second opening; means for driving fluid through said sieve and fiber endwise of said bore; exterior bayonet grooves on said housing member near one end thereof, a motor having an end bell, and a flange member adapted to receive said housing therewithin, and means on said flange member engaging said grooves adapted to fasten said housing member to said bell.

8. In a device of the character described; a housing member having a uniform interior cylindrical bore extending entirely therethrough; a rectangular hopper opening radially through the wall upon said bore; a second opening through the wall of said housing, a sieve secured across the second opening; means for driving fluid through said sieve and fiber endwise of said bore; and means for detachably securing said sieve to said housing comprising a spout member adapted to detachably connect to said housing to receive material passing said second opening.

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