A23L 2/04 (2006.01) A47J 19/02 (2006.01)

Hand Operated Juicing System and Methods

Fig. 1A

Abstract: Embodiments related to hand operated apparatus for extracting juice from food matter contained within juicer cartridges are described. In one embodiment, a juicer includes a hand operated transmission arranged to displace one or more pressing elements in order to compress a juicer cartridge disposed in a juicing chamber such that juice may be extracted. Another embodiment of a hand operated juicer is also described in which a juicer includes a liquid impermeable layer that at least partially surrounds food matter contained therein with at least a portion of the liquid impermeable layer surrounding the food matter being sized and shaped to be gripped by a user's hand and squeezed to apply pressure to the food matter. The hand operated juicer also includes an outlet formed in the liquid impermeable layer such that when the liquid impermeable layer is squeezed by a user extracted juice flows out of the outlet.
Published:

— with international search report (Art. 21(3))

before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
HAND OPERATED JUICING SYSTEM AND METHODS

FIELD

[0001] Disclosed embodiments are related to juicing systems and methods.

BACKGROUND

[0002] Devices for extracting fresh juice from food matter such as fruits and vegetables have been developed over the years for both home and commercial markets. Typical commercial juicers tend to be large, expensive, and are unsuitable for home or small retail environments. Systems more suitable for home and small retail environments have utilized several different methods for extracting juice from the food matter as described below.

[0003] In centrifugal-type juicers, food matter is fed through a chute, or other entrance, where a set of mechanical blades rotating at a high speed cut and/or grind the food matter to a pulp. Centripetal force is then applied by rapidly rotating the food matter to separate juice from the pulp through a filter. A second type of home and retail juicer is a masticating juicer which uses an auger to crush the food matter into a pulp. The resulting pulp is further compressed by the auger to extract juice through an associated filter. Another type of juicer is a hydraulic press juicer which typically uses a hydraulic press to compress food matter between one or more surfaces that are in direct contact with the food matter to extract the juice.

SUMMARY

[0004] In one embodiment, a hand operated juicer includes a juicing chamber constructed and arranged to receive one or more juicer cartridges containing food matter. The hand operated juicer also includes one or more pressing elements constructed and arranged to apply a pressing force to the one or more juicer cartridges. A hand operated transmission is constructed and arranged to displace the one or more pressing elements to apply the pressing force to the one or more juicer cartridges and extract juice from the food matter contained therein.

[0005] In another embodiment, a hand operated juicer includes a liquid impermeable layer at least partially surrounding food matter. At least a portion of the liquid impermeable
layer surrounding the food matter is sized and shaped to be gripped by a user's hand and squeezed to apply pressure to the food matter. The hand operated juicer also includes an outlet formed in the liquid impermeable layer such that when the liquid impermeable layer is squeezed by a user extracted juice flows out of the outlet.

[0006] In yet another embodiment, a method for juicing food matter includes: placing one or more juicer cartridges containing food matter into a juicing chamber constructed and arranged to receive the one or more juicer cartridges; actuating a hand operated transmission constructed and arranged to displace one or more pressing elements to apply a pressing force to the one or more juicer cartridges to extract juice from the food matter contained therein; and flowing the extracted juice through an outlet of the juicing cartridge and an outlet of the juicing chamber into a beverage container.

[0007] It should be appreciated that the foregoing concepts, and additional concepts discussed below, may be arranged in any suitable combination, as the present disclosure is not limited in this respect. Further, other advantages and novel features of the present disclosure will become apparent from the following detailed description of various non-limiting embodiments when considered in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF DRAWINGS

[0008] The accompanying drawings are not intended to be drawn to scale. In the drawings, each identical or nearly identical component that is illustrated in various figures may be represented by a like numeral. For purposes of clarity, not every component may be labeled in every drawing. In the drawings:

[0009] Fig. 1A is a schematic representation of one embodiment of a hand operated juicer with a loaded cartridge;

[0010] Fig. 1B is a schematic representation of one embodiment of an openable juicer housing;

[0011] Fig. 1C is a schematic representation of one embodiment of a juicer with a movable pressing plate;

[0012] Fig. 2 is a schematic representation of one embodiment of a juicer cartridge; and
Fig. 3 is a schematic representation of one embodiment of a squeeze pouch juicer.

DETAILED DESCRIPTION

The inventors have recognized numerous benefits associated with hand operated juicing systems such as a smaller form factor, portability, and convenient operation. For example, typical juicing appliances tend to be large and may occupy a significant amount of counter storage space, but a hand operated juicer may have a smaller form factor such that it may occupy a less counter space when not in use and/or be more portable. A hand operated juicer may also be less noisy during use, and may not require electrical power to operate. A hand operated juicer may also allow single servings of juice dispensed with minimal effort and easy cleanup.

In one embodiment, a hand operated juicing system is configured to receive one or more juicer cartridges containing food matter. For example, the juicer may include a juicing chamber inside of a housing that is sized and/or shaped to receive the one or more juicer cartridges. The juicer may then dispense juice from the one or more juicer cartridges by compressing the juicer cartridges with a pressing element such as one or more displaceable platens. Alternatively, other ways of applying pressure to a juicer cartridge including, for example, rollers, a sphincter, a twisting mechanism, a roll up mechanism, an auger, or any other suitable device capable of applying a pressure to the juicer cartridge as the disclosure is not so limited. Regardless of which specific device is used, the pressing element is operated using an associated handle which is actuated either a single, or multiple times, to either partially, or fully, displace the pressing element relative to the juicing chamber and apply the desired pressure to the juicer cartridge to extract juice therefrom.

In some instances, it may be desirable to apply more pressure to a juicer cartridge than a user is capable of applying directly by hand. To increase the applied pressure, the juicing system may include a hand operated transmission coupling the handle to the one or more pressing elements in order to provide a desired mechanical advantage for displacing the pressing elements and facilitate juicing. For example, a handle and shaft may be coupled to a transmission, such as a reducing gear train, to convert a displacement of a handle into a smaller displacement of the one or more pressing elements to increase the
applied pressure. In such an embodiment, the compressive force, and associated pressure, exerted on a juicer cartridge may be greater than the force applied to a handle of a juicer by a user. Thus, juicing may become more facile. While a reducing gear train is noted above, it should be noted that any appropriate transmission capable of providing a mechanical advantage for actuating the pressing element may be used including, for example, a lever mechanism, a rotatable handle, a worm gear, a helical push ram, a piston pump, a ball screw, a wine press mechanism, or any other appropriate mechanism capable of providing a desired mechanical advantage as the disclosure is not so limited.

In order to avoid back up of a pressing element, and a corresponding reduction in pressure applied to a juicer cartridge, in some embodiments a juicer may also include an anti-backup mechanism to prevent reverse motion of the pressing element towards the initial unactuated position. The anti-backup mechanism may be associated with either the handle or pressing element in a direct pressing juicer to prevent reverse motion of the pressing element. Alternatively the anti-backup mechanism may be associated with a transmission or pressing element of a juicer where the handle is indirectly coupled to the one or more pressing elements. In either case, the anti-backup mechanism is constructed and arranged to restrict the motion of one or more pressing platens in at least one direction until it is released as might be done at the end of juicing. For example, in one embodiment, the anti-backup mechanism may be a ratchet and pawl mechanism operatively coupled to a transmission or shaft of the juicer. Depending on the embodiment, full displacement of the one or more pressing platens may be achieved after multiple actuations of a handle. Therefore, the anti-backup mechanism prevents the pressing element from moving in the reverse direction during juicing. For example, the transmission and anti-backup mechanism may be constructed and arranged so that the pressing elements are fully displaced after 10 to 20 actuations of the handle. However, any suitable number of actuations may be required as the disclosure is not so limited. While a ratchet and pawl mechanism is mentioned above, other one way mechanisms may be used, including, but not limited to, various types of linear clutches, intermittent gears, crown ratchet and pin mechanisms, and slide and grip type mechanisms.

In some instances, it may be desirable to reduce, and/or substantially eliminate, direct contact between the extracted juice and the juicer to help reduce possible contamination of the juicer during use. In such an embodiment, an outlet of the one or more
juicer cartridges is arranged such that it dispenses extracted juice directly into and/or through an outlet of the juicing chamber. However, it should be understood that embodiments in which juice does contact a portion of the juicer prior to being dispensed are also contemplated as the disclosure is not so limited.

[0019] In some embodiments, it may be also be desirable for a juicing system to dispense juice directly into a beverage container. For example, a juicer may be configured to simply rest on a beverage container during juice extraction. In such an embodiment, an outlet of the juicing chamber may be arranged such that extracted juice is directed into the beverage container. Alternatively a juicing system may include a custom beverage receptacle that interfaces with a juicing press via a screw fit or snap fit, or any other appropriate mechanism. Such an embodiment may be desirable to further minimize mess during juicing.

[0020] Depending on the embodiment, a juicer may apply between about 40 pounds of force to 150 pounds of force to a juicer cartridge during the approximately final 0.1 inches to 0.5 inches of movement of the one or more pressing platens, or other appropriate pressing elements used to extract juice from a juicer cartridge. For example, in some embodiments, a user may apply between about 20 pounds of force and 50 pounds of force to the handle of a juicer, and an associated mechanism in the juicer may create a mechanical advantage such that the force applied by the pressing platens to the juicer cartridge is about two to three times the force applied to the handle. However, it should be understood that while particular dimensions and forces are noted above with regards to a specific embodiment of a juicer, any appropriate combination of forces, distances of force application, total pressing element travel, and gaps might be used as the disclosure is not so limited. The force ranges and displacements noted above are directed to an appliance sized for consumer applications.

[0021] In addition to the possible ranges of applied force, a juicer may apply at least 20 psi to a surface of a juicer cartridge during juice extraction. Further, in some embodiments, a juicer may apply between about 25 psi to about 40 psi to a surface of a juicer cartridge during the final distances of platen displacement as noted above. However, it should be understood that other pressures might be applied by a juicer as the disclosure is not so limited.

[0022] It should be understood that the above noted methods of operation of a hand operated juicer are also generally applicable for use without a juicer cartridge. For example,
in one embodiment, food matter may be loaded directly into a juicing chamber and compressed by one or more displaceable platens, as described above. Depending on the embodiment, the outlet of the juicer may include one or more mesh screens or other appropriate mechanisms capable of filtering the liquid as it is dispensed through the outlet.

The inventors have also recognized the benefits associated with another embodiment of a hand operated juicer where a user is able to apply force directly to the food matter to extract juice from the food matter. In such an embodiment, a hand operated juicer may include a liquid impermeable layer that at least partially surrounds food matter, and an outlet formed in the liquid impermeable layer. The liquid impermeable layer may be sized and shaped to be squeezed by a user's hand in order to extract juice from the food matter. The outlet is arranged so that extracted juice flows from within the liquid impermeable layer out through the outlet and into an appropriate beverage container. Depending on the food matter present in the hand operated juicer, the extracted juice may either be consumed directly or mixed with another beverage, e.g. water, as a flavor additive. For example, in one embodiment, the food matter is a citrus fruit, such as the flesh of a lemon, that may be squeezed into a desired beverage container.

In some embodiments, a liquid permeable layer is disposed within the liquid impermeable layer between the food matter and the outlet. For example, the liquid permeable layer may at least partially surround the food matter and serve to allow liquid to pass through while retaining solid food matter including pulp, seeds, pith, peel, or any other undesirable food matter. Alternatively, in another embodiment, the liquid permeable layer fully surrounds the food matter. The liquid impermeable layer may also be located within or outside of the outlet as the disclosure is not so limited.

The liquid impermeable layer may be made from any suitable food safe material capable of containing both solid food matter and liquid as well as being sufficiently strong and flexible enough to be easily squeezed by a user to produce juice without tearing. For example, the liquid impermeable layer may be made from a flexible plastic or metallic film. Alternatively, a liquid permeable material such as cardboard may be coated with a liquid impermeable film, though any appropriate flexible liquid impermeable material may be used. Depending on the embodiment, the liquid impermeable layer may have sufficient
strength and rigidity to prevent premature application of pressure to the food matter contained in the juicer cartridge as might occur from transport and storage.

[0026] Appropriate materials for the liquid permeable layer include, but are not limited to, a filtration membrane, a nonwoven filtration material, woven mesh, fabric filters, plates with appropriately sized holes or openings, combinations of the above, and other appropriate types of filters. Additionally, a liquid permeable layer may be made from any appropriate material including, for example, metals such as aluminum, polylactic acid, polypropylene fibers, and blended polyester-polyethylene. In one exemplary embodiment, a liquid permeable layer may be made from food-grade porous membrane comprising a plurality of pores of a desired size. Other possible embodiments for the liquid permeable layer include aluminum or plastic meshes, cheesecloth, and paper filters. In view of the above, it should be understood that the one or more liquid permeable layers may correspond to any porous material including pores of a suitable size capable of filtering the juice extracted from a juicer cartridge.

[0027] The one or more liquid permeable layers may have an appropriate filtration size selected according to the food matter held in one or more compartments such that liquid can pass through the layers while trapping pulp, seeds, pith, peel, and any other undesirable matter. By way of example, ginger may typically generate large, fibrous pulp matter that can be trapped by larger pores while still permitting the juice extracted from the ginger to pass through the liquid permeable layer. In contrast, strawberries may process to a pulp matter having small fibers and seeds, which requires a liquid permeable layer with smaller pores to trap the seeds. While in some embodiments, a filtration size may be selected to remove substantially all of the solid material such as pulp from a juice, in some embodiments, a filtration size of a liquid permeable layer might be selected to permit a certain portion of the solid materials to pass through. In instances where a juicer cartridge includes multiple types of food matter in separate pouches requiring different levels of filtration, a juicer cartridge may include one or more liquid permeable layers with different filtration sizes associated with the different food matter.

[0028] For the sake of clarity, the juicer cartridges and juicer systems described herein generically refer to the use of food matter from which juice may be extracted. However, it should be understood that the food matter used in both the juicer cartridges and
juicer systems may correspond to any appropriate food matter. For example, food matter may include such nonlimiting items as: fruit; vegetables; meat; fish; plant matter; flavorings; dietary supplements such as vitamins, protein powders, ginseng; and/or any other ingestible product that might be desirably included in a beverage.

Turning now to the figures, several specific nonlimiting embodiments are described in more detail. For the sake of clarity, certain features are described with regards to a particular embodiment. However, it should be understood that the various features and embodiments depicted in the figures and described herein may be combined in any appropriate fashion as the disclosure is not so limited.

Figs. 1A-2 depicts one embodiment of a hand operated juicer 100 configured to receive a juicer cartridge 200 containing food matter. In the depicted embodiment, the juicer 100 includes an exterior housing 101 and a juicing chamber 117 constructed to receive one or more juicer cartridges. It should be understood that the juicing chamber 117 may be sized and/or oriented to receive any number of juicer cartridges 200 in any desired orientation as the disclosure is not so limited. However, for ease of illustration, the pressing chamber 117 is, at times, shown and/or described with a single cartridge. The juicer also includes an outlet 118 associated with the outlet 206 of a juicer cartridge 200, and oriented such that juice is dispensed into a beverage container 120. The depicted juicer outlet is located on the bottom surface of the juicer. However, embodiments in which the juicer outlet is located on a side or other appropriate surface of the juicer are also contemplated.

The depicted juicer 100 also includes one or more pressing platens, or other suitable pressing element, for applying a compressive force to the juicer cartridge 200. For example as depicted in the figures, a first pressing platen 110 is displaceable towards a second pressing platen 112 which is fixed relative to the housing 101.

Depending on the embodiment, the first pressing platen 110 is connected to a transmission 108 and anti-backup mechanism 109, which are further connected to a shaft 104 and handle 102. The shaft 104 further includes gear teeth 106 to interface with the transmission 108, though other interfaces such as a friction interface, clutch arrangement, or other appropriate coupling are also possible. A force is applied to the transmission system by actuating the handle 102 in direction T1 in order to actuate the transmission and correspondingly displace the first pressing platen 110 towards the second pressing platen 112.
In some embodiments, the transmission 108 is configured to provide a mechanical advantage to the first pressing platen 110 to facilitate juicing with less effort from the user. For example, the transmission may include a mechanism such as a reducing gear train, to convert a displacement of the handle 102 into a smaller displacement of the first pressing platen, and to increase the applied pressure. In such an embodiment, the compressive force, and associated pressure, exerted on a juicer cartridge may be greater than the force applied to a handle of a juicer by a user. Thus, juicing may become more facile. Depending on the embodiment, the anti-backup mechanism 109 may be arranged to limit the first pressing platen 110 to displacement in a direction towards the second platen 112 during juicing. In such an embodiment, reciprocating actuation of the handle 102 back and forth applies successively increasing compression to a juicer cartridge. However, it should be understood that the juicer may be operated with any mechanism able to provide the appropriate compressive force to the juicer cartridge as the disclosure is not so limited. For example, while a reducing gear train is noted above, any appropriate transmission capable of providing a mechanical advantage for actuating the pressing element may be used including, a lever mechanism or a rotatable handle and worm gear. Alternatively, in some embodiments a mechanical advantage may not be provided and direct coupling between the handle and pressing element may be used.

As the handle is actuated, a compressive force applied to a juicer cartridge 200 is transmitted to the food matter 205 contained therein to extract juice. The extracted juice flows from within the juicer cartridge 200 through the juicer cartridge outlet 206 and the juicer outlet 118 to an exterior of the juicer. In some embodiments, a juicer 100 interfaces with a beverage container 120 such that juice is dispensed directly into the beverage container requiring minimal cleanup. Depending on the particular embodiment, the juicer 100 may simply rest on the beverage container 120, or may include an interface such as a snap fit or screw fit in order to form a more secure connection with the beverage container.

As noted previously, in some embodiments it is desirable to prevent contact between extracted juice and the juicing system. For example, as depicted in Fig. IB, in one embodiment, a juicer outlet 118 defined by a through hole 114, or other appropriate feature, is located in the second pressing platen 112 and the juicer cartridge outlet 206 extends through the outlet. In such an embodiment, juice flows directly from the juicer cartridge
outlet 206 into a beverage container 120 without coming into contact with any portion of the juicer during use.

[0036] It should be understood that the one or more pressing platens 110 and 112, or other pressing element, may be constructed and arranged in any number of ways. For example, in one embodiment, the one or more pressing elements are sized to correspond to an approximate size of a juicer cartridge when compressed during juice extraction. The one or more pressing elements may be formed from any appropriate material including, but not limited to, metals such as steel, stainless steel, and cast iron, aluminum as well as various ceramics, plastics, elastomers, or any other suitable material, and combinations of the above.

[0037] In some embodiments, it may be desirable to modify the platens, or other pressing element, to further facilitate juicing. For example, the surfaces of a pressing element may be coated with non-stick materials and/or materials with antimicrobial properties such as silver plating/coating, silver nanoparticle, and/or other appropriate surface coatings. Additionally, a face of a pressing element may include grooves and/or other shapes to increase the pressure applied to a juicer cartridge, increase a pressing area of the juicer cartridge, and/or improve handling of a juicer cartridge. For example, opposing mating grooves may be formed on a pair of platens which nest together where a surface area along the grooves is greater than a projected area of the pressing surfaces. The grooves may either be sharp peaks, rounded peaks, sinusoidal, square, or have any other appropriate shape. Alternatively, in another embodiment, at least one of the platens may have a concave curvature. The other platen may either be flat, have a concave curvature, a convex curvature, and/or a complementary shape in such an embodiment. Without wishing to be bound by theory, such an arrangement may provide an increased compression to the outer perimeter of the food matter located between the platens which further enhances juice extraction by helping to contain the food matter within the center of the platen and guide juice extraction.

[0038] In some embodiments, the housing of a juicing system is openable to facilitate placing and removing one or more juicer cartridges 200 into a juicing chamber. In one exemplary embodiment, and as shown in Fig. 1B, a housing 101 includes a selectively openable connection 122, such as a hinge and latch arrangement, which allows the housing to open for loading and unloading of a juicer cartridge 200 from a juicing chamber 117. Alternatively, the connection 122 may be a snap fit or any other appropriate mechanism to
allow the housing to open for insertion of a juicer cartridge, as the disclosure is not so limited. In another embodiment, the housing includes two separate pieces which are selectively connected via an interface such as a snap fit, screw fit, or any other appropriate coupling mechanism to allow the housing to open. One such embodiment is shown in Fig. 1C which depicts the bottom surface of the housing corresponding to the lower second pressing platen 112 being selectively removable to facilitate loading and unloading of a juicer cartridge. In such an embodiment, an interface 124 such as a screw fit or snap fit may allow the second pressing platen 112 to attach to the housing 101. While the pressing platen has been shown as being selectively detachable, other components of the housing might be used as well as the disclosure is not so limited.

Having described the various components of juicer 100, its method of operation is described in more detail. Initially, one or more juicer cartridges 200 are loaded into the juicing chamber 117 by opening the juicing chamber via an appropriate openable housing connection, as described above. After closing the juicing chamber 117, the juicer 100 is positioned above an appropriate beverage container 120. Juice is then extracted from food matter 205 contained within the juicer cartridge 200 by actuating the handle 102 one or more times in direction T1 to displace the first pressing platen 110 toward the second pressing platen thus compressing the juicer cartridge. The extracted juice flows out of an outlet 206 of the juicing cartridge and an outlet of the juicing chamber 114 into the beverage container 120. During actuation, an anti-backup mechanism 109 prevents the first platen 110 from displacing away from the second platen 112 between successive actuations of the handle 102. Full displacement of the first platen 110 corresponding to a desired level of juice extraction may be achieved after about 10-20 actuations of the handle 102. After juicing, the anti-backup mechanism is released and the juicing chamber 117 is opened to allow removal of the spent juicing cartridge.

Referring to Fig. 2, one embodiment of a juicer cartridge 200 is described in further detail. As depicted in the figure, a juicer cartridge 200 includes a liquid impermeable exterior layer 202, an inner cavity 203, and an outlet 206 in fluid communication between the inner cavity 203 and an outside environment exterior to the cartridge. The outer layer 202 is made from any one or more suitable materials capable of providing desired design criteria such as sufficient structural integrity, protection from the outside environment, and tamper
resistance. Further, the outer layer 202 is flexible so that it may be compressed during juicing without rupturing. In some embodiments, the outer layer is made from a biodegradable material including, but not limited to, biodegradable plant-based polymers such as cellulose, cellophane, or polylactic acid. In some embodiments, the juicer cartridge also includes one or more liquid permeable layers 204 dispersed within the liquid impermeable layer and that at least partially, or fully, surround the food matter located within the inner cavity 203. In some instances the liquid permeable layer forms one or more internal pouches located within the external impermeable layer and may be sized according to the food matter placed therein. For example, in one embodiment related to consumer applications, the pouches have dimensions ranging from about 0.5 inches to 3 inches depending on the contents of each compartment.

Other arrangements, configurations, orientations, and/or suitable materials for liquid impermeable layers and liquid permeable layers which may be used to make a juicer cartridge are also described in U.S. application no. 14/229,940 filed on Mar. 30, 2014, published as US 2014/0314918, and international application PCT/US2014/034676 filed Apr. 18, 2014, published as WO 2014/182423, the disclosures of which are herein incorporated by reference in their entirety.

In another embodiment, a hand operated juicer corresponds to a squeeze pouch 300 as depicted in Fig. 3. In such an embodiment, a flexible, liquid impermeable exterior layer 302 has an interior region 303 containing food matter. At least a portion, and in some embodiments all, of the liquid impermeable layer surrounding the food matter is sized and shaped to be gripped by a user's hand and squeezed to apply pressure to the food matter contained therein and extract juice which then flows out of an outlet 306 is in fluid communication with the interior region 303 and into a beverage container 310. Hand operated juicers may have any dimension or volume that may be easily gripped and squeezed by a user. However, in one embodiment a portion of liquid impermeable exterior layer containing the food matter, and intended to be gripped by a user, has a diameter, or width, between about 2 inches and 4 inches and a volume between 3 ounces and 5 ounces.

In some embodiments, it is desirable to filter the extracted juice. In such an embodiment, a juicer 300 further includes one or more liquid permeable layers 304, similar to those described above regarding other embodiments, that is disposed within the liquid
impermeable layer 302 between the food matter and the outlet 306. Depending on the embodiment, the liquid permeable layer at least partially, or fully surrounds the food matter. Alternatively, the liquid permeable layer may be located within, or on an exterior, of the outlet. In either case, the liquid permeable may serve to trap solid food matter including pulp, pith, seeds, peel, or any other undesirable food matter within the juicer while allowing juice to flow out of the outlet.

[0044] In some embodiments, the outlet of the juicer further includes an interface 308 constructed and arranged to mate with an opening of an appropriate beverage container 310. For example, the juicer may simply be sized and shaped to accept, or fit into, the opening of an associated beverage container. Alternatively, the outlet and opening of the beverage container may cooperate to form a selectively removable connection. For example, the outlet may include an interface such as a screw fitting that is selectively attachable to a complementary interface on a container such as a bottle. In such an embodiment, juice may be dispensed directly into the beverage container while avoiding spilling the extracted juice thus greatly reducing the possibility of making a mess during juicing. Alternative connections include, but are not limited to, a snap fit, friction fit, a nozzle shaped and sized to be inserted into a beverage container opening, or any other appropriate interface which may help to direct the extracted juice into a desired beverage container.

[0045] In some embodiments, a hand operated juicer 300 further includes one or more compartments 312 at least partially surrounded by the liquid impermeable layer 302. For example, the one or more compartments may contain additional materials such as a gel, powder, dissolvable substance, or other desirable material, and may be burstable such that the contents of the compartment may be released when an appropriate pressure is applied. In such an embodiment, a burstable compartment may open due to pressure application during juicing to permit mixing of the contents with the liquid which may be extracted from the food matter contained within the liquid impermeable layer. Alternatively, a crushable material or tablet may be located within a compartment such that it is crushed and mixed with the juice during extraction. Possible ingredients that may be delivered in the ways described above include, but are not limited to, flavorings, additives, and dietary supplements such as protein supplements, vitamins, extracts, minerals, dried fruits, dried vegetables, nuts, herbs, freeze dried oils, spices, alcohol, and any other desired consumable substance.
Depending on the embodiment, a hand operated juicer 300 as described above may be operated as follows. The juicer 300 containing food matter inside of a liquid impermeable layer 302 is attached to a beverage container 310 via an interface 306. The beverage container may be empty if the user desires to consume juice directly, or it may contain another liquid, e.g. water, to which juice may be added to serve as a flavoring additive. A user then extracts juice from the food matter by squeezing the outer liquid impermeable layer 302. In such an embodiment, when a user squeezes the liquid impermeable layer 302, the pressure is transferred through any intervening layers to the food matter which is compressed to extract juice therefrom. The force applied by a user may also be sufficient to burst one or more compartments 312 containing additional consumable materials or liquids which are subsequently mix with the juice during extraction. The extracted juice flows through one or more liquid permeable layers 304, if included, before being dispensed out of the outlet 306 into the beverage container 310. In some embodiments, the liquid impermeable layer 302, and any liquid permeable layers 304, are constructed to be openable after juicing to enable consumption of the remaining food matter after juicing. For example, the liquid impermeable layer 302 and liquid permeable layers 304 may include peel-able films, scored opening areas, removable sticker labels, or any other appropriate arrangement capable of allowing access to the inner contents of the layers for removing the food matter after juice extraction. Consequently, juiced food matter contained within the liquid impermeable and/or liquid permeable layers may be removed for consumption and/or composting and the remaining portions of the juicer may be recycled or otherwise disposed of.

While the present teachings have been described in conjunction with various embodiments and examples, it is not intended that the present teachings be limited to such embodiments or examples. On the contrary, the present teachings encompass various alternatives, modifications, and equivalents, as will be appreciated by those of skill in the art. Accordingly, the foregoing description and drawings are by way of example only.
What is claimed is:

1. A hand operated juicer comprising:
   a juicing chamber constructed and arranged to receive one or more juicer cartridges containing food matter;
   one or more pressing elements constructed and arranged to apply a pressing force to the one or more juicer cartridges;
   a hand operated transmission constructed and arranged to displace the one or more pressing elements to apply the pressing force to the one or more juicer cartridges and extract juice from the food matter contained therein.

2. The hand operated juicer of claim 1, wherein the juicing chamber includes an outlet constructed and arranged to direct the extracted juice into a container.

3. The hand operated juicer of claim 2, wherein the juicer cartridge outlet is constructed and arranged to accept a juicer cartridge outlet that extends out from the outlet, and wherein the extracted juice does not contact the juicing chamber during juicing.

4. The hand operated juicer of claim 1, wherein the transmission provides a mechanical advantage.

5. The hand operated juicer of claim 4, wherein the transmission is constructed and arranged to apply between about 40 pounds of force to about 150 pounds of force to the one or more pressing elements during the final 0.1 inches to 0.5 inches of movement of the one or more pressing elements.

6. The hand operated juicer of claim 1, wherein the juicing chamber is selectively openable to receive and remove the one or more juicer cartridges.
7. The hand operated juicer of claim 1, wherein the transmission includes an anti-backup mechanism.

8. The hand operated juicer of claim 7, wherein the anti-backup mechanism is a ratchet and pawl mechanism.

9. The hand operated juicer of claim 1, further comprising a handle operatively coupled to the transmission,

10. The hand operated juicer of claim 9, wherein the transmission is constructed and arranged to fully displace the one or more pressing elements after 10 to 20 actuations of the handle.

11. A hand operated juicer comprising:
    a liquid impermeable layer at least partially surrounding food matter, wherein at least a portion of the liquid impermeable layer surrounding the food matter is sized and shaped to be gripped by a user's hand and squeezed to apply pressure to the food matter;
    an outlet formed in the liquid impermeable layer, wherein when the liquid impermeable layer is squeezed by a user extracted juice flows out of the outlet.

12. The hand operated juicer of claim 11, a liquid permeable layer disposed within the liquid impermeable layer between the food matter and the outlet,

13. The hand operated juicer of claim 12, wherein the liquid permeable layer at least partially surrounds the food matter.

14. The hand operated juicer of claim 13, wherein the liquid permeable layer fully surrounds the food matter.

15. The hand operated juicer of claim 12, wherein the liquid permeable layer is located between the food matter and the outlet.
16. The hand operated juicer of claim 12, wherein the liquid permeable layer comprises at least one of a mesh, cheese cloth, and filter.

17. The hand operated juicer of claim 11, wherein the outlet includes an interface constructed and arranged to mate with a beverage container.

18. The hand operated juicer of claim 17, wherein the interface is constructed and arranged to attach to the beverage container.

19. The hand operated juicer of claim 11, wherein the liquid impermeable layer is constructed and arranged to be openable to remove the food matter.

20. The hand operated juicer of claim 11, wherein the liquid permeable layer is constructed and arranged to be openable to remove the food matter.

21. The hand operated juicer of claim 11, further comprising one or more compartments at least partially surrounded by the liquid impermeable layer, wherein the one or more compartments contain a material, and wherein the compartments are burstable to release the one or more materials when the liquid impermeable layer is squeezed to extract juice.

22. A method for juicing food matter, the method comprising:
   placing one or more juicer cartridges containing food matter into a juicing chamber constructed and arranged to receive the one or more juicer cartridges;
   actuating a hand operated transmission constructed and arranged to displace one or more pressing elements to apply a pressing force to the one or more juicer cartridges to extract juice from the food matter contained therein;
   flowing the extracted juice through an outlet of the juicing cartridge and an outlet of the juicing chamber into a beverage container.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A23L 2/04; A23N 1/02; A47J 19/02 (2016.01)
CPC - A23L 2/04; A23N 1/02; A47J 19/022

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) Classifications: A23L 2/04; 2/06; A23N 1/02; A47J 19/02, 19/06 (2016.01)
CPC Classifications: A23L 2/04; 2/06; A23N 1/02; A47J 19/02, 19/022, 19/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatSeer (US, EP, WO, JP, DE, GB, CN, FR, KR, ES, AU, IN, CA, INPADOC Data); Google; Google/Scholar; EBSCO; Keywords: cartridge*, pack*, bag*, pouch*, container*, squeeze*, press*, compress*, extract*, food*, juice*, liquid*, edible*, concentrate*, handle*, actuation, single*

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 6,196,122 B1 (LAI MH) March 6, 2001; figures 1B, 2, 3; column 2, lines 50-51</td>
<td>1, 2, 4-6, 9</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>X</td>
<td>US 5,429,273 A (KING DC et al.) July 4, 1995; figures 2, 3a, 4; column 3, lines 62-67; column 4, lines 8-9; column 4, lines 36-39; column 4, lines 45-49; column 7, lines 24-38; column 8, lines 1-2</td>
<td>1-3, 7-10</td>
</tr>
<tr>
<td>X</td>
<td>US 20140314918 A1 (WETTLAUFER D et al.) October 23, 2014; figure 3; paragraphs [0029], [0031]</td>
<td>11-21</td>
</tr>
<tr>
<td>Y</td>
<td>WO 2014/182423 A2 (JUICERO, INC) November 13, 2014; abstract</td>
<td>22</td>
</tr>
<tr>
<td>A</td>
<td>US 7,152,520 B2 (KERNER JM) December 26, 2006; entire document</td>
<td>1-10, 22</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C.

See patent family annex.

- Special categories of cited documents:
  "A" document defining the general state of the art which is not considered to be of particular relevance
  "E" earlier application or patent but published on or after the international filing date
  "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
  "O" document referring to an oral disclosure, use, exhibition or other means
  "P" document published prior to the international filing date but later than the priority date claimed
  "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
  "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
  "Y" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
  "&" document member of the same patent family

Date of the actual completion of the international search: 16 May 2016 (16.05.2016)

Date of mailing of the international search report: 10 Jun 2016

Name and mailing address of the ISA/Authorized officer
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-8300

Form PCT/ISA/210 (second sheet) (January 2015)
**INTERNATIONAL SEARCH REPORT**

<table>
<thead>
<tr>
<th>Box No. II</th>
<th>Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:</td>
</tr>
<tr>
<td>1.</td>
<td>☐ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:</td>
</tr>
<tr>
<td>2.</td>
<td>☐ Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:</td>
</tr>
<tr>
<td>3.</td>
<td>☐ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Box No. III</th>
<th>Observations where unity of invention is lacking (Continuation of item 3 of first sheet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This International Searching Authority found multiple inventions in this international application, as follows:</td>
</tr>
<tr>
<td></td>
<td>- * -Continued Within the Next Supplemental Box-**-</td>
</tr>
<tr>
<td></td>
<td>1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.</td>
</tr>
<tr>
<td></td>
<td>2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.</td>
</tr>
<tr>
<td></td>
<td>3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:</td>
</tr>
<tr>
<td></td>
<td>4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:</td>
</tr>
</tbody>
</table>

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/2 10 (continuation of first sheet (2)) (January 2015)
This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I: Claims 1-10 and 22 are directed toward a juicing chamber, pressing elements, and a hand operated transmission.

Group II: Claims 11-21 are directed toward a liquid impermeable layer.

The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Group I include a method for juicing food matter, the method comprising: placing one or more juicer cartridges containing food matter into a juicing chamber constructed and arranged to receive the one or more juicer cartridges; actuating a hand operated transmission constructed and arranged to displace one or more pressing elements to apply a pressing force to the one or more juicer cartridges to extract juice from the food matter contained therein; flowing the extracted juice through an outlet of the juicing cartridge and an outlet of the juicing chamber into a beverage container, which are not present in Group II.

Group II include a liquid impermeable layer at least partially surrounding food matter, wherein at least a portion of the liquid impermeable layer surrounding the food matter is sized and shaped to be gripped by a user's hand and squeezed to apply pressure to the food matter; an outlet formed in the liquid impermeable layer, wherein when the liquid impermeable layer is squeezed by a user extracted juice flows out of the outlet, which are not present in Group I.

The common technical feature of Groups I and II is a hand operated juicer.

These common technical features are disclosed by US 6,196,122 B1 (Lai). Lai discloses a hand operated juicer (manual juicer shown; figure 1; abstract).

Since the common technical features are previously disclosed by the Lai reference, the common features are not special and so Groups I and II lack unity.