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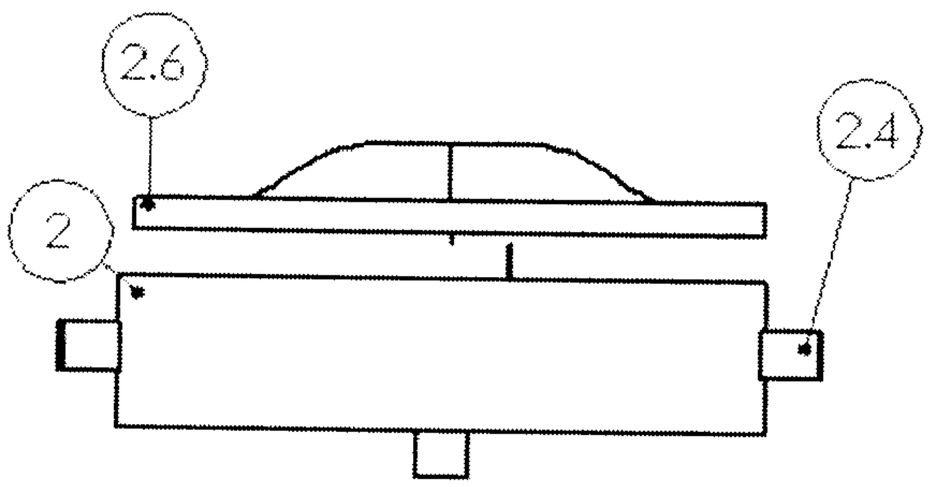
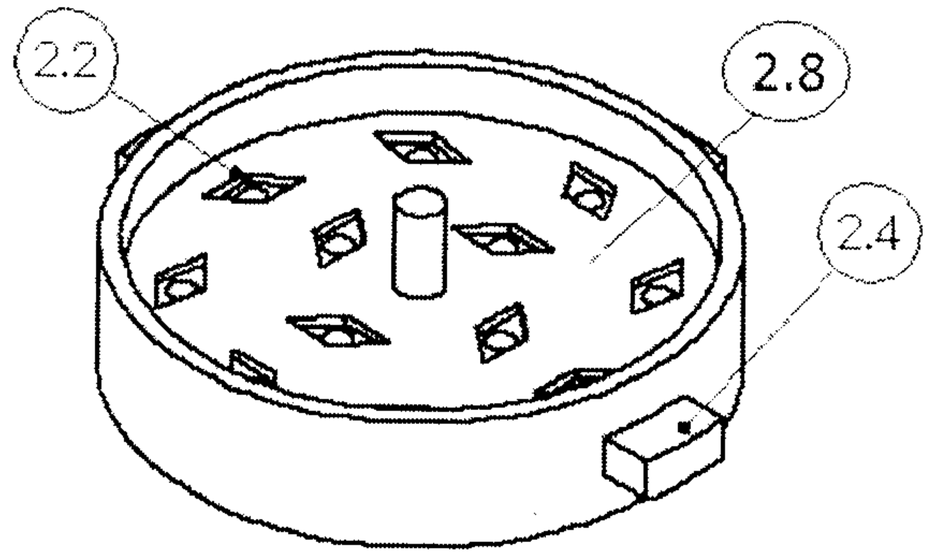


elevated view of top cap and handle



model view of top cap 2

(57) Abrégé/Abstract:
The present invention involves a system and a method for grinding herbs, tobacco, cannabis and the like. The portable electric herb grinding system was designed with the intention of facilitating user experience in grinding smoking materials, where the traditional methods were cumbersome and not physically possible by patients who consume such herbs or smoking materials for pain relief. The portable electric herb grinding system is comprised of top cap, which is removed to allow user place desired smoking material or vegetative material onto bottom spider design sheet, whereas bottom sheet is in concerted with a mating gear ring movable by worm gear mechanism powered by at least one DC motor. The plurality of top grinding teeth protruding downward, and bottom grinding teeth protruding upward allows for a grinding operation to happen. A plurality of aperture in the spider web design, on bottom sheet, allows for the ground herb, smoking material or vegetative material to fall onto an output compartment that can be conveniently reached by sliding it outward.

ABSTRACT

The present invention involves a system and a method for grinding herbs, tobacco, cannabis and the like. The portable electric herb grinding system was designed with the intention of facilitating user experience in grinding smoking materials, where the traditional methods were cumbersome and not physically possible by patients who consume such herbs or smoking materials for pain relief. The portable electric herb grinding system is comprised of top cap, which is removed to allow user place desired smoking material or vegetative material onto bottom spider design sheet, whereas bottom sheet is in concerted with a mating gear ring movable by worm gear mechanism powered by at least one DC motor. The plurality of top grinding teeth protruding downward, and bottom grinding teeth protruding upward allows for a grinding operation to happen. A plurality of aperture in the spider web design, on bottom sheet, allows for the ground herb, smoking material or vegetative material to fall onto an output compartment that can be conveniently reached by sliding it outward.

BACKGROUND

FIELD OF INVENTION

The present invention relates generally to grinding apparatuses utilized to grind or shred herbs, leafs or vegetative materials, such as but not limited to, tobacco and cannabis. Particularly, this invention relates to a portable, electric grinding apparatus capable of grinding or shredding tobacco or cannabis.

DESCRIPTION OF THE PRIOR ART

The use of cannabis for treatment of select medical conditions has become more widely known, and legalization of cannabis for medical and/or recreational purposes is becoming more widespread. One example of medical use of cannabis is to ease the pain caused by chronic symptoms, such as arthritis. However, use of cannabis presents a particular challenge to those afflicted with arthritis, as grinding or cutting of cannabis flowers can be difficult or impossible with arthritic hands using conventional tools.

The invention disclosed herein is a portable electric herb grinder that requires little physical effort with minimal hand movements, and provides optimum and consistent grinding results. Although motivation for the invention was derived from a desire to help medical cannabis users, the use is not limited and grinder may alternatively be used for other purposes, including use on other edible herbs or products that benefit from or require a grinding action before consumption, such as but not limited to tobacco or vegetative materials. The benefit of grinding the said smoking material, tobacco and cannabis, and edible herbs to smaller particles, is to create higher surface area of the ground particles which results in more flavor release. Moreover, grinding or shredding smoking material is required for variety of consumption means, such as but not limited to, making of tobacco or cannabis cigarettes.

The word smoking material herein refers to herbs such as cannabis and tobacco, which all benefit from or require a grinding action before consumption and can be ground and shredded by the invention presented herein. There are many methods of grinding smoking materials. Before the advent of mechanical devices, such herbs were simply crushed in a person's hand via fingers or use of scissors or sharp knives or blades. Though partially effective, the hand method was time consuming, unsanitary and was unable to provide consistency in the size of the ground particles. The human touch involved in grinding, potentially reduces the quality of such herbs due to stickiness nature of some herbs, such as cannabis, where they get stuck to user's hands and the surface oil of human skin, impacting the quality of the herb.

In case of cannabis for example, kief, which is the smallest ground cannabis particle, contains the most THC, or tetrahydrocannabinol, and it gets attached to any surface it comes in contact with such as but not limited to fingers, grinders or smoking apparatuses. THC is the active chemical in cannabis that users need for pain relief, hence its preservation enhances the consumption experience. For that reason, the design and material of the grinding apparatus plays a big factor in collecting and preserving the THC in the cannabis.

Today, the most widely used portable cannabis grinders are manual and include at least two chambers, a top cap, and a bottom cap. The top half of the first chamber is formed by the top cap. A plurality of grinding knives (teeth) protrudes from the top cap into the volume of the first chamber. The bottom half of the first chamber also has a plurality of grinding knives and several apertures that lead into the second chamber. The bottom half of the second chamber is formed by the bottom cap of the grinder. Optionally, the second chamber can have a screen that leads into an optional third chamber for isolating the smallest particles, in which case the bottom half of the third chamber forms the bottom of the grinder. Users operate such grinders by placing smoking material inside the bottom chamber and rotating the chambers against each other in opposite directions. There are, however, many disadvantages with such grinders. For example, they are difficult to operate, especially for patients with arthritic hands, as they require force and strong grips to be twisted. This struggle increases when a grinder has been in use for a while and, in case of cannabis, the Kief keeps adding on the sides of the grinding chamber (such as but not limited to, the teeth and walls) which results in more resistance created in the chamber and requiring more force from the user to twist the chambers against each other in opposite directions. Examples of such grinding apparatuses are: US Patent No. 8,695,906, US Patent No. 12980330 and US Patent No. 11704629

Besides manually operated grinders, electric grinders also exist for grinding smoking material and edible herbs. Electric grinders exists in two variations. In one variation, at least one DC powered motor is directly connected to a moving platform or moving blades. Examples of such grinding apparatuses are: US Patent No. 12472372 and CA patent No. 2394931. The issues with electric grinders that are directly connected to DC powered motor, include but not limit to; consistency of grind result, bulkiness of the device which conflicts with the “portability” aspect, and most importantly, clogging up overtime.

The output motion of motors can be measured in Angular Velocity (units of Revolution per Minute, also known as RPM) and the delivered Torque measured in Newton Meter (N.M) or Ounce-Inches (Oz-In). There is an inverse relationship between these two output factors; RPM and Torque. Motors generally produce high RPM movement by the motor shaft, where the shaft rotates very fast, with small Torque. Grinding apparatuses that incorporate direct connect to DC motor are usually high speed and low on torque. This causes inconsistency in the grinding result as the motor is rotating the blades or teeth at a high speed and the blades or teeth

merely cut through the smoking material, instead of grinding it. Also the high speed of the blades generates heat inside the grinding chamber. As more rotation occurs, friction between the surfaces creates heat in addition to the heat generated by high speed rotation of the blades. According to law of conservation of energy, in devices powered by at least one DC motor, electrical energy is transformed into mechanical energy and heat. Hence, high speed rotation escalates the overall heat and reduces the efficiency of the system. The generated heat could also damage the herb and the active chemical within it during grinding. In addition, such apparatuses clog up over time due to having small particles of herb, such as kief in cannabis, being stuck all over the grinding chamber, around the teeth/blades and the walls, which increases the resistance in the system, and overcomes the power delivered by the motor. This cause is called "Stall Torque" and it occurs when the torque delivered by motor, cannot match and exceed the minimum torque required to overcome the resistance created by clogging of smoking material in the device. In this case, the device becomes unusable after some time.

The other variation of electric grinders are grinding apparatuses that are indirectly connected to at least one DC motor via spur or planar gears. Examples of such grinding apparatuses are US Application no. 14885144, US Pat No. 8,960,580B2. The use of spur or planar gears in such apparatuses, decreases the angular velocity (RPM) of moving blades or plates and increases the torque of the output. Some DC motor manufacturers include a gear box which contains several planar gears to give more options to their customers. There is an inverse relationship between the angular velocity of the gears and the radius of gears. If a small drive gear is connected to a larger gear, in terms of the radius of 1 to 3, then the rotational velocity is reduced from 3 to 1 in the larger gear when mechanism is in use. The portable grinders that use the spur gear mechanism, or planar gear mechanism, powered by DC motors are usually long in height, or one other dimensions, as each gear reduction mechanism adds to the overall size of the system. Also, gear mechanisms introduce inefficiency in a system, caused by friction between the teeth of the gear and supporting centers of the gears. The inefficiency can be reduced by having metal gears compared to plastic, but that increases the cost of manufacturing and end cost for the user. Moreover, adding more components to the device, adds up to the cost and weight making it inconvenient for the user and manufacturer.

Some of the existing portable herb grinders have storage means within the apparatus for users to store and carry ground or unground herbs with the grinder. This feature allows users to carry and ground material at any time or place. The disadvantage found in existing grinders is the accessibility of the said storage since they are mainly twist offs. The twist off storage chambers suffer from clogging over time, making it harder for users to access, especially those suffering from arthritic hands. Our invention in its preferred embodiment, addresses the issue of both manual and electric grinders storage compartments by utilizing a magnetic door where user can easily pull to open and access the inside and push to reattach the door to the magnet.

Based on the thorough analysis of existing grinding apparatuses utilized for smoking material and edible herbs, there exists a need for a portable electric grinder that is easy to use, requires the least amount of manual work by the user, produces consistent result, is durable and not costly in manufacturing. In addition, the need should be satisfied with a portable electric grinder that is indirectly connected to a DC motor for a better control over speed and power and ultimately the result.

The invention presented herein in its preferred embodiment, is portable, cordless and easy to use as it is driven by a motor. User can get consistent result by filling in the grinding chamber and pressing a button. Furthermore, this invention in its preferred embodiment utilizes a worm gear mechanism and its properties to achieve a significant speed reduction and power amplification in a small form factor. This lower speed (relative to existing electric grinders) does not generate heat to damage the herb to be ground. Also another benefit of utilizing the worm gear mechanism is that it places the motor relatively away from the grinding chamber, reducing potential for heat transfer from the motor to the grinding chamber, where the herb can be affected.

SUMMARY OF THE INVENTION

Cannabis, tobacco and other edible herbs will often be shred or ground just before being used, in order to assure freshness of the shredded or ground material, as well as increasing the surface area of the herb. Briefly, the present invention involves a system and a method for grinding herbs, tobacco, cannabis and the like. In one aspect, a portable electric herb grinder is provided. The herb grinder herein includes:

A grinding means for holding a supply of herbs and smoking material to be ground within it.

A drive means including drive components that activate and operate the grinding operation.

An output means for containing the output of the grinding operation.

A storage chamber for optionally carrying material or objects in it.

According to a preferred embodiment of this invention, there is a grinding chamber comprising:

Top half, including a handle attached to non-rotatable top cap, top sheet embedded within non-rotatable top cap, and teeth protruding downward from top sheet. The top half of grinding chamber specifically comprises of:

-Non-rotating top cap at the upper end of the chamber holding top sheet within it, coupled to a handle on top of it.

-top sheet embedded within non-rotating top cap including a plurality of teeth protruding downward whereas teeth are spaced angularly apart from one another about the longitudinal axis in orientations lying parallel

- handle coupled to top of non-rotatable top cap assisting in lifting top cap

- lock mechanism that engages with the keys found on the outside of top cap whereas keys attached to top cap are locked within the locking path of locking mechanism whereas locking mechanism is mounted to the floor via four legs.

Bottom half including bottom sheet, mating gear ring and teeth. Bottom half specifically comprises:

- Bottom sheet incorporating pit spaces for support and holes for allowing ground material in grinding chamber to fall onto an output mean, and further incorporating a plurality of teeth protruding upward and spaced angularly apart from one another about the center axis orthogonal to the sheet plane. In a preferred embodiment of the apparatus, bottom sheet is designed like a spider web, maximizing pit space size and holes size in conjunction with space allowed for teeth.

- Bottom sheet will be further embedded within the hub of a mating gear ring that mates orthogonally with worm gear. In a preferred embodiment, the worm gear will be connected to DC motor via motor shaft.

- Mating gear ring, surrounding bottom sheet, rotating bottom sheet about the center axis orthogonal to the sheet axis when its corresponding worm gear is in action.

Grinding chamber is mounted on top of output compartment where the output compartment comprises:

- Output tray located under bottom sheet of grinding chamber, enclosed by bottom sheet from the top, and open at the bottom. The tray collects ground particles that fall from grinding chamber's bottom sheet. The tray is slide able within the confined space and allows user to reach the output of apparatus by simply sliding the tray outward.

The output means is mounted with threading, bayonet mounts or the like from its two sides to the floor.

The invention further includes a drive means containing components that activate the movement of worm gear and its corresponding mating gear ring, initiating the operation of grinding chamber, whereas the drive means includes:

- Small DC motor mounted on the floor. Motor is coupled to drive shaft on one end whereas motor rotates the drive shaft in place.

- Drive shaft having one end coupled to motor for rotation therewith and the other end coupled to a worm gear for driving the rotation of worm gear

- Worm gear coupled to one end of drive shaft, to be rotated by the motor. Worm gear is affixed to mating gear surrounding bottom sheet whereas the mating gear is to be rotated by the said worm gear and the said drive shaft rotation. The rotation of worm gear and its corresponding mating gear ring will rotate the bottom sheet in place performing the grinding of herbs and smoking material in the grinding chamber.

- Worm gear mount holding the open end of worm gear, whereas the mount is mounted to the floor with threading, bayonet mounts or the like.

- Battery that powers DC motor and PCB

- PCB, connected to motor and battery, in charge of dispensing measured current at a pre-calculated time.

Storage chamber providing space for users to keep preferred objects or materials, whereas storage chamber specifically includes:

- A confined space enclosed by walls whereas one of the walls allows user to access the confined space by being openable like a door whereas the side of the door is hinged to the side.

The portable herb grinder and components may be made of any material capable of grinding herbs. Examples of materials of which the herb grinder and components may be made include, but are not limited to: metals, plastics, composites, wood, and the like.

In another aspect, a method of grinding herbs is provided. The method may begin by accessing the said bottom sheet and placing a quantity of unground smoking material or herbs on the cavity of bottom sheet. In a preferred embodiment, accessing bottom sheet is through lifting the handle coupled to non-rotating top cap, ultimately lifting the top cap. In another embodiment, bottom sheet could be accessed by sliding top cap to the side to access bottom sheet and sliding it back to close the grinding chamber. In this embodiment, top cap may be slid vertically or horizontally. In another embodiment, top cap could be partially or fully removed and placed by a bigger top grinding chamber, allowing more material to be grinded by the apparatus. In another embodiment, top cap may be either spring loaded or not. In still another embodiment, top cap may be held in place by friction, gravity, or a spring force, such that top cap may be manually opened and/or closed. In another embodiment, a button may open and/or close the top cap. In yet another embodiment, a lever may be used to open and/or close the top cap.

Once unground smoking material is placed on bottom sheet, top cap is placed on top of bottom sheet, specifically top cap ring is placed within mating gear ring that hold bottom sheet. In another embodiment, top cap could be placed on mating gear ring by magnetic force.

In a preferred embodiment, top cap is further locked in a lock mechanism, where top cap locking keys fit into the locking path of lock mechanism. Top cap locking keys slide into locking path, keeping top cap stationary when apparatus is in operation. In another embodiment, top cap can be locked via magnets or similar force. In another embodiment, top cap is held stationary by being twisting in bottom chamber. In another embodiment, other means such as but not limited to, hinge or clippers are used to lock the top cap in place. Top cap, top sheet, top sheet teeth and output tray are locked during operation.

Once top cap is locked, user then activates the motor and grinding operation occurs in the grinding chamber. In a preferred embodiment, motor is activated by pressing a button. In another embodiment, motor is activated by a touch sensor.

By activating motor, the high rotational speed of motor shaft is delivered to worm gear, and the worm gear rotates the mating gear ring around bottom sheet. Utilizing worm gear properties in this mechanism allows the worm gear to reduce the motor's speed and amplify its torque (power), causing strong but slow rotation of mating gear ring. The relative movement between bottom sheet grinding teeth and the locked top grinding teeth results in grinding and shredding of smoking material inserted between them. Once herbs or smoking materials are ground as small as the holes on bottom sheet, they will fall onto the tray beneath grinding chamber. A pre-calculated time in PCB determines the time of operation. In a preferred embodiment, user can access the output of the system, ground smoking material, by conveniently sliding the tray out like a drawer. In another embodiment, this tray may be partially or fully removed and the apparatus can be placed on top of another apparatus that can utilize the ground smoking material. In another embodiment, the tray may be a revolving door such that as the door is rotated, contents may be removed. In this embodiment, the door may be rotatable either horizontally or vertically. Further still, the tray may be openable and closable in any manner. In another embodiment, the tray may be held in place by friction, gravity, or a spring force, such that the tray may be manually opened and/or closed. In another embodiment, a button may open and/or close the tray. In yet another embodiment, a lever may be used to open and/or close the tray.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention will now be described in conjunction with the accompanying drawings in which:

Fig1 - depicts an isometric view of one embodiment of a portable electric herb grinder formed in according to a preferred embodiment of the present invention, including an optional storage section.

Fig2 - depicts a side view and an isometric view of top cap of the portable electric herb grinder of Fig1.

Fig3 - depicts a top view of the bottom sheet of the portable electric herb grinder of Fig1.

Fig4- depicts a top view of worm gear mechanism of the portable electric herb grinder of Fig1.

Fig5-depicts an exploded side view of top cap handle, top cap, mating gear ring and tray of the portable electric herb grinder of Fig1

Fig6 – depicts a top view of top sheet teeth and bottom sheet teeth of the portable electric herb grinder of Fig1

DETAILED DESCRIPTION

Embedded drawings are intended as a description of the preferred embodiments of the invention and does not present the only forms in which the present invention may be constructed and/or utilized. The description sets forth the functions and the sequence of steps for constructing and operating the invention in connection with the illustrated embodiments. In describing the components of the portable electric herb grinder and alternative embodiments of some of the components, the same reference number may be used for elements that are the same as, or similar to, elements described in other versions or embodiments.

Referring to FIG. 1, there is generally shown a **portable electric herb grinder 20**, its components and their positioning with respect to each other, formed in accordance with the preferred embodiment of the present invention. The **portable electric herb grinder 20** in Fig 1 comprises of **worm gear 6.2**, **worm gear mount 6.8**, **lock mechanism 8**, **locking path 8.2**, **floor 12**, **PCB (Portable Circuit Board) 14, Button 14.4, DC motor 16, storage 18, mating gear ring 23, tray 25** and **battery 28**.

Referring now to Fig2, **top cap 2** comprises of **top cap teeth 2.2, top cap locking keys 2.4**, and **top cap handle 2.6**. User is able to unlock and lift **top cap 2** by twisting **top cap 2** left or right, moving **top cap locking keys 2.4** from **locking path 8.2** embedded in **lock mechanism 8** (Fig 1), and simply lifting top cap by its **handle 2.6**. **Top cap locking keys 2.4** lock **top cap 2**, respectively locking **top sheet 2.8** and **top cap teeth 2.2**, translationally and rotationally around the central axis orthogonal to **top sheet 2.8** plane when the system is in operation, as well as allowing the system to operate regardless of the relative orientation of **portable electric herb grinder 20** to gravity (system can be upside down and still operate and grind the herbs to small pieces).

Now referring to Fig 3, **bottom sheet 4** is embedded within **mating gear ring 23** and includes **spider web holes 4.4**, **pit spaces 4.1** and **bottom sheet teeth 4.6.** In other embodiments, bottom sheet teeth could vary in numbers and in location and/or pattern on bottom sheet. For example in one embodiment, a number of teeth are placed only on one half of bottom sheet, leaving the other half as pit spaces and holes only. In another embodiment, three triangular patterns could be created by a number of teeth with pit spaces and holes in between the triangles, allowing room for smoking material and herbs to be placed. In another embodiment, one quarter of bottom sheet could be filled with teeth, leaving the rest of bottom sheet as holes and pit spaces. In another embodiment, 2 quarters of bottom sheet could be filled with teeth, leaving the rest of bottom sheet as holes and pit spaces. Similarly, in another embodiment ¾ of bottom sheet could be filled with teeth.

The shape of teeth could also vary within embodiments. In a preferred embodiment, bottom sheet and top sheet teeth are teeth with sharp edges. In another embodiment, the teeth could be triangles with their sharp edges pointing upward, from bottom sheet, and pointing downwards from top sheet. In another embodiment, teeth could be nails. In yet another embodiment teeth could be screws.

User lifts **top cap 2** and places smoking material to be ground between the rows of **bottom sheet teeth 4.6**. The grinding teeth are arranged to allow in a pattern for convenient placing of smoking material and for the most consistent smooth grinding operation. The teeth on **bottom sheet 4** are spaced out in a pattern that creates gaps known as **pit spaces 4.1**. The advantage of utilizing **pit spaces 4.1** is the facilitation of herb insertion.

The rotational movement generated by **DC motor 16**, rotates **worm gear 6.2** via **motor shaft 6.4**. The continuous engagement between **worm gear 6.2** and its **mating gear ring 23** enables **bottom sheet 4** to rotate in place, relative to **top cap 2,** allowing smoking material to pass between **Bottom sheet teeth 4.6** and stationary **top cap teeth 2.2**. As portrayed in Fig 6, the point where one **bottom sheet teeth 4.6** passes one **top sheet teeth 2.2** is called **point of engagement 4.8**. **Points of engagement 4.8** affect the speed of operation, and they identify the

torque required to overcome the resistance of each **point of engagement 4.8** against the rotation of motor. Certain factors impact the number of **points of engagement 4.8** per fixed unit of time, such as but not limited to, number of teeth on each plane and rotational velocity of one of the planes, or both of them relative to one another. Because the surface area of **bottom sheet 4** and **top sheet 2.8** are limited (for a portable grinding apparatus), the size and shape of the teeth may change to allow more or less teeth on each plane, where it would increase or decrease the total **points of engagement** in a fix amount of time. It is worth noting that each **point of engagement** will cause certain voltage drop across our power source, due to the torque required to overcome the resistance of smoking material to be ground between aforementioned top and bottom teeth, drawing more power from the motor to grind. This resistance will increase as the system operates for a number of times and small particles of smoking material, such as kief for cannabis, get stuck and pile up (including but not limited to) around the teeth of **bottom sheet teeth 4.6, top sheet teeth 2.2** and **spider web holes 4.4**. The theory of **points of engagement**, is the reason why any direct connection of DC motor to a moving blade, plate or teeth is not a good mechanism, as it will not be able to accommodate the torque required to overcome the many points of engagement caused by numerous teeth moving in one direction in one rotation of bottom sheet. The existing portable or non-portable electric grinders include few teeth to reduce the **point of engagement 4.8** and give the ability to motor to keep operating. If any existing electric herb grinder, which are all either direct connect of motor to the rotating teeth, sheet or indirect connect to motor using planar or spur gear sets, attempts to increase the gear ratio (reduce RPM and increase Torque), they will drastically increase the size of the device by introducing many small to larger spur or planar gears, which introduce more friction and result in more inefficiency in the system.

If a given quantity of smoking material is considered to require a fix number **of points of engagement 4.8** between **top sheet teeth 2.2** and **bottom sheet teeth 4.6** to grind, the duration of such operation will depend on the system's ability to deliver the required torque within the number of teeth that are incorporated on **bottom sheet 4** and **top sheet 2.8**. The most optimum way to achieve a high torque within this system is to use a **worm gear mechanism 6**, whether directly connected to motor (the most efficient way) or whether connected by planar or other means of gear mechanisms used for changing the orientation of each component. Regardless, to achieve a high torque operation in such a device that is portable, and runs on low voltage power source (less than 24V), a **worm gear 6.2** is the most optimum mechanism. The **worm gear mechanism 6**, due to significant speed reduction and torque amplification effect, allows a reduction in size of the **top sheet teeth 2.2** and **bottom sheet teeth 4.6** and ultimately an increase in the number of teeth on both caps, so as to maximize the points of engagement that can be handled by **DC motor 16**. Without the implementation of **worm gear mechanism 6**, no DC motor can produce such high torque to

speed ratio, without having an increase in size or use of very small metal gears which will make the invention cost more for manufacturing and end user, as well as reducing system efficiency.

Referring back to Fig3, **bottom sheet 4** includes **spider web holes 4.4** with **mating gear ring 23**, **bottom sheet teeth 4.6** and **pit areas 4.1**. **Bottom sheet 4** design ensures enough support is provided for the rotational shear force and stress caused by each **point of engagement 4.8**, as well as allowing for the number of **spider web holes 4.4** to be maximized. In current grinder designs, for manufacturing purposes, holes on the grinder bottom sheets are usually in a circular path, or in some cases uniform shapes.

In a preferred embodiment, as portrayed in figure 3, spider web design is used to maximize the support in the outer radius of bottom sheet, where more points of engagement occur and more reaction force on the teeth is applied, whereas the center of **bottom sheet 4** does not experience a high torque. The above argument on the spider web design has been derived using the physics of relationship between distance, force and torque (Torque = Distance * Force). In another embodiment, bottom sheet holes are shaped in a circular pattern and are spaced angularly apart from one another about the longitudinal axis. The said embodiment facilitates manufacturing.

Now referring to Fig4, **worm gear 6.2** is coupled to **motor shaft 6.4** and is mounted to **floor 12** by **worm gear mount 6.8. Worm gear 6.2** rotates at the same rotational velocity and torque of **motor shaft 6.4** but loses some momentum due to the friction caused between **worm gear 6.2** and inside **worm gear mount 6.8**.

In a preferred embodiment, **motor 16** is an electric DC motor, and is powered by rechargeable battery system comprising at least one rechargeable **battery 28** and a control unit**, PCB 14**. Preferably, **PCB 14** is positioned on top of **floor 12**, connecting to **button 14.4**, and allowing user to operate the machine with a push of **button 14.4.** In another embodiment, **button 14.4** could be a touch sensor.

In a preferred embodiment, **tray 25** is locked in place during operation by the means of magnets .The user can access the ground material by simply sliding out **tray 25**, which is more convenient compared to existing grinders where user has to twist them open. In another embodiment, **tray 25,** could have a screen of mesh, also known as Kief catcher, on top of tray for users who like to collect the mentioned kief. In another embodiment, a shaker or vibrating mechanism for shaking **tray 25** can be implemented to allow more Kief to pass through the screen, onto the output tray.

Diagrams

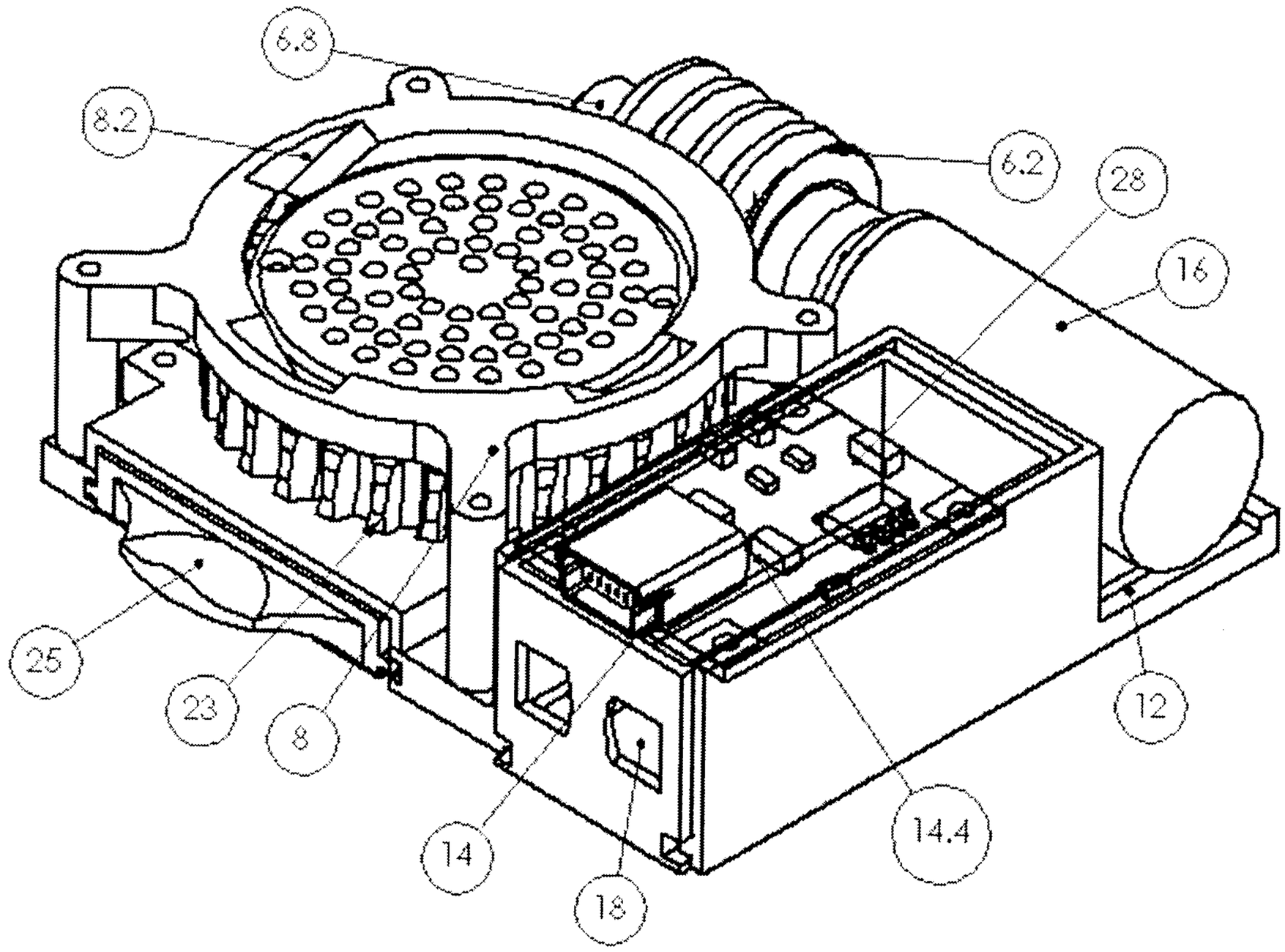
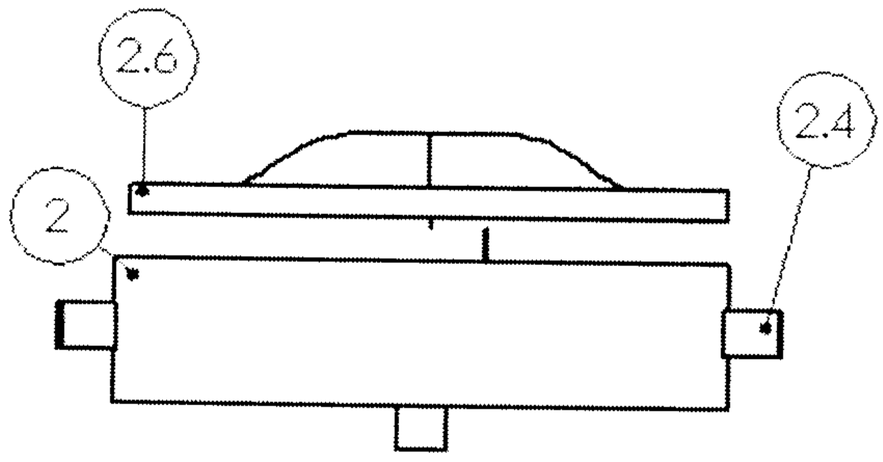
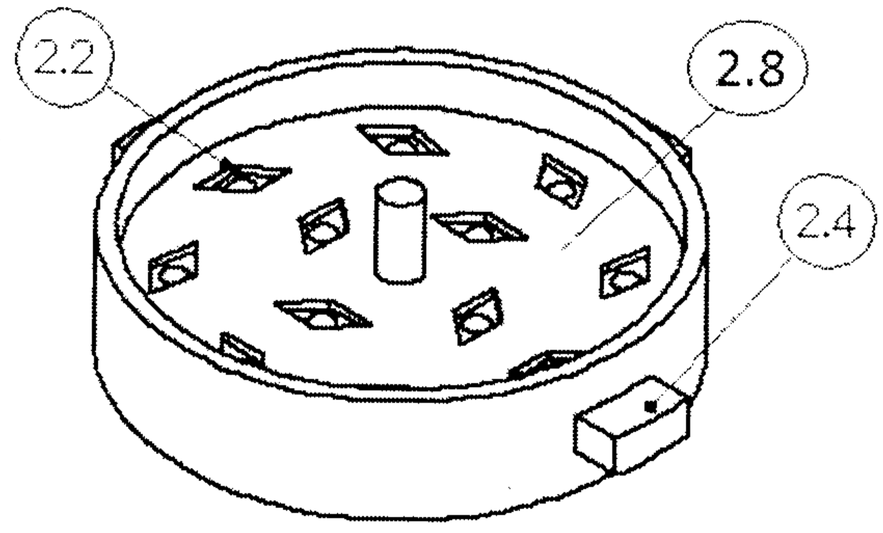


Fig1 – Isometric View of Portable electric herb grinder 20



elevated view of top cap and handle



model view of top cap 2

Fig2 – Top cap 2

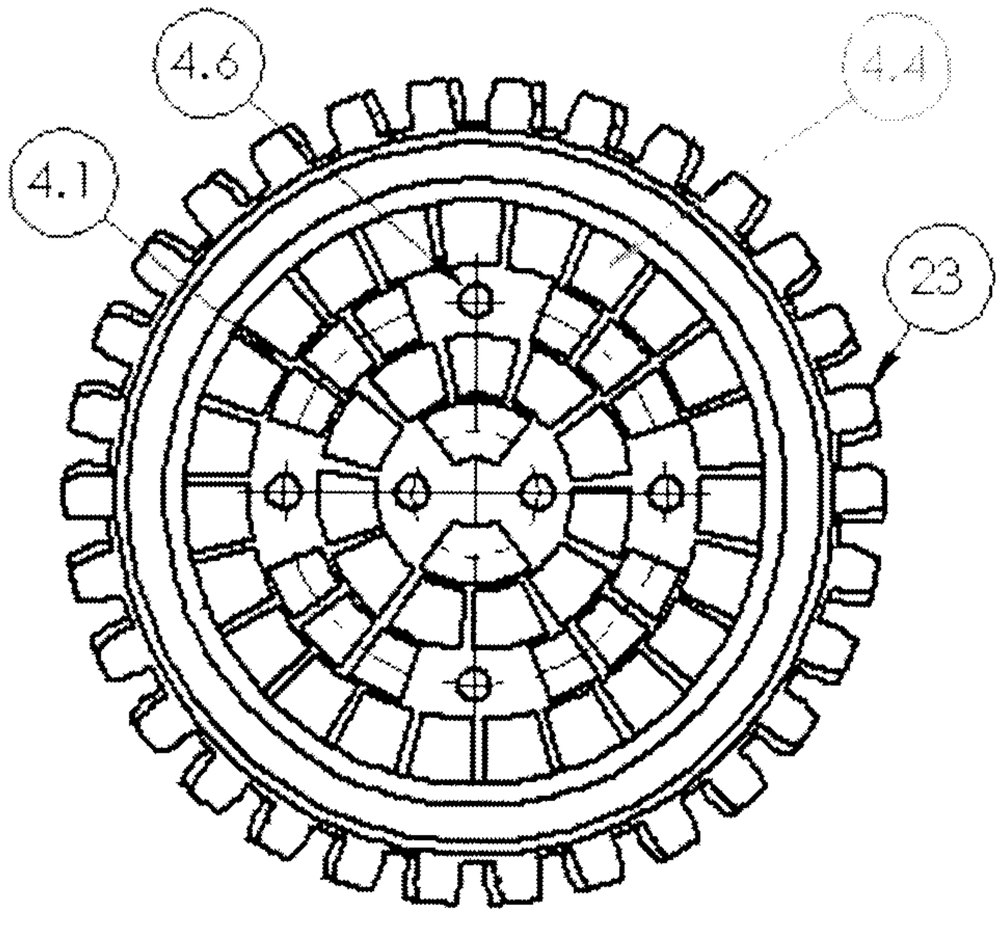


Figure 3 – Bottom Sheet 4

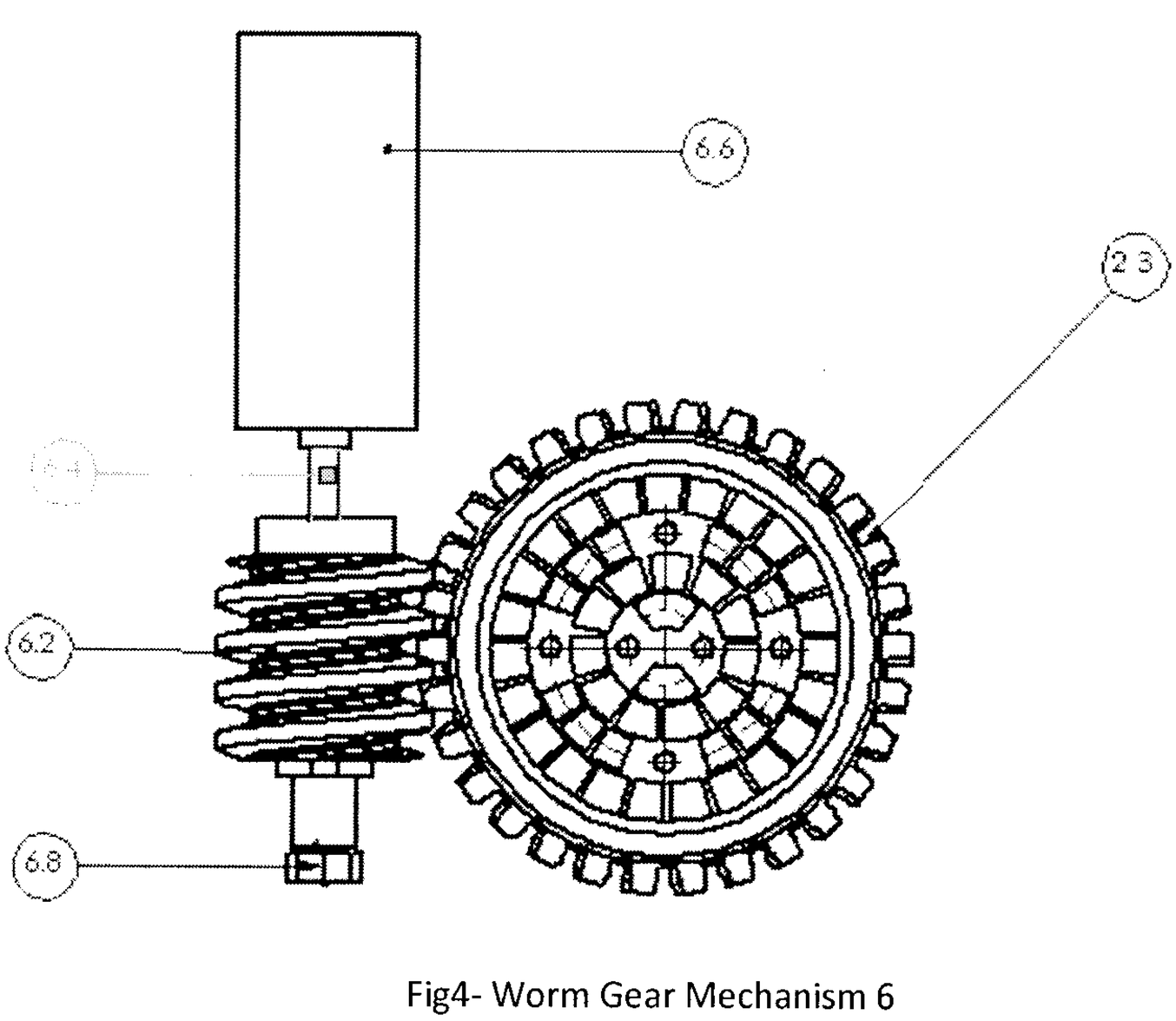


Fig4- Worm Gear Mechanism 6

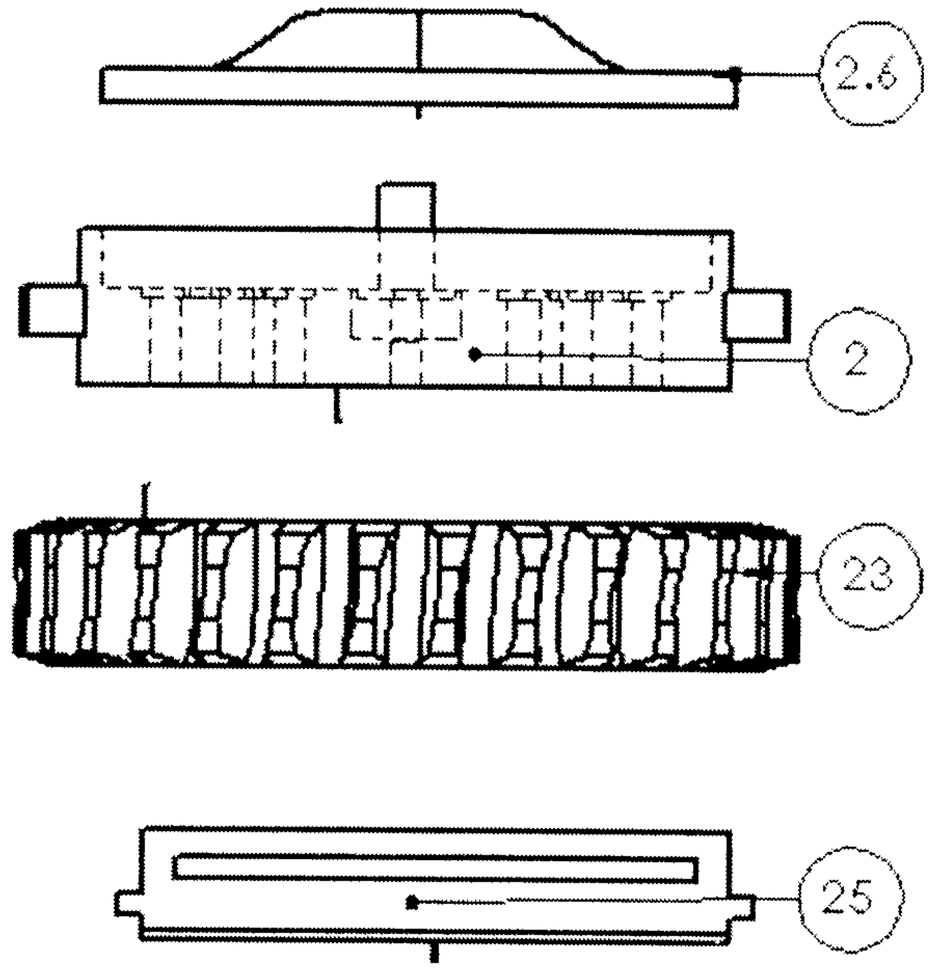


Fig 5 – Elevated view of Top cap, Gear Ring and Tray

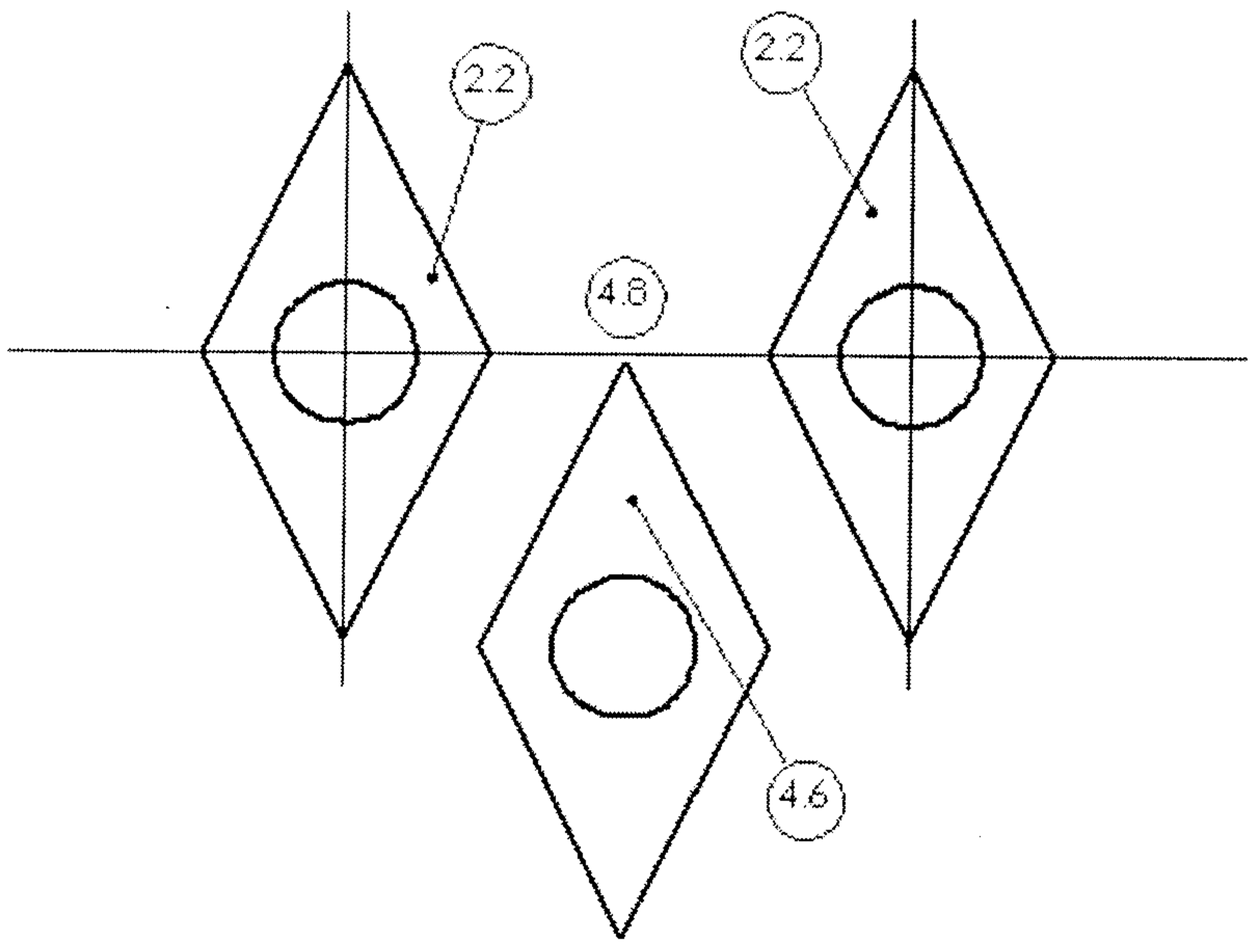
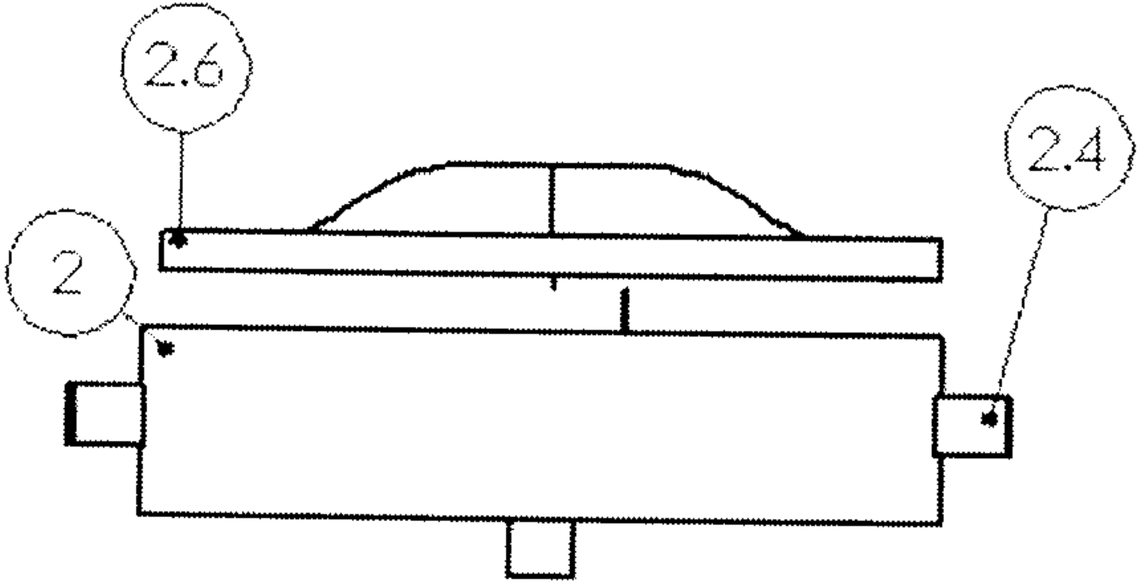
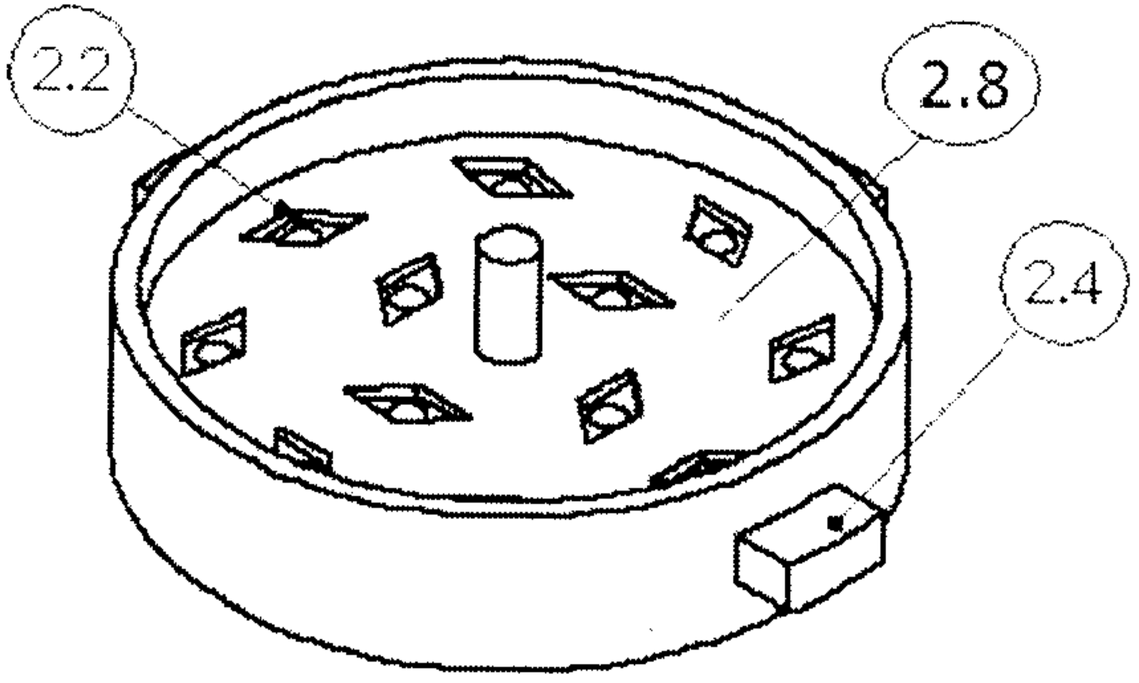


Fig6 – Point of Engagement 4.8 created between Top Sheet Teeth (2.2) and Bottom Sheet Teeth (4.6)



elevated view of top cap and handle



model view of top cap 2