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(54) **Hand held lighter**

Handfeuerzeug

Briquet

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Description

[0001] The present invention relates to a hand held lighter. The present invention is particularly concerned with a hand held lighter of the type comprising a fuel container, a fuel valve for allowing fuel to be fed from the fuel container to an ignition point, a lever for opening the fuel valve, a flint and a rotatably mounted sparking wheel contacting the flint, so that when the sparking wheel is rotated, sparks are generated by the flint and projected to the ignition point. In operation, a user will rotate the sparking wheel with their thumb while simultaneously depressing the lever to allow fuel to be fed to the ignition point, where it is ignited by the sparks.

[0002] This type of hand held lighter is very well known in the art but concerns have been raised about safety issues relating to simple designs of hand held lighters. In particular, there is a concern that a lighter of this type might be unintentionally ignited whilst being carried, causing a fire hazard. Further, there is a desire to make hand held lighters child resistant to prevent children playing with lighters accidentally creating a fire.

[0003] Lighters with safety features are known in the art from US 6,074,198, US 5,997,281 and US 6,146,128. For example Chinese patent application number 97219832.6 discloses a child resistant lighter in which it is made relatively difficult for a user's thumb to contact the sparking wheel. This may be achieved by rotatably mounting the sparking wheel with respect to a pair of side wheels, collectively mounted with the sparking wheel and preferably of greater diameter than it. Alternatively, a shield which surrounds the ignition point may be extended upwards and inwards so that the edges of the shield rest above the sparking wheel. In both cases, the user has to press their thumb very firmly between the edges of the shield or the side wheels in order to contact the sparking wheel. The side wheels tend to rotate instead of the sparking wheel. This reduces the possibility of accidental ignition and makes it harder for children to create the necessary sparks to light the lighter.

[0004] In Chinese patent application no. 98208691.1, an additional safety feature is disclosed, in which resilient means are placed beneath the part of the lever which is operated by the user. The user has to apply a greater force to the lever in order to release the fuel for ignition. Again, this helps to prevent accidental ignition or ignition by children playing with a lighter.

[0005] It is further desired to improve the safety features of a hand held lighter compared to what is known in this prior art.

[0006] The present inventor has realised that an additional safety feature can be provided if the sole means of rotating the sparking wheel is provided by a frictional drive between the sparking wheel and the side wheel. The frictional force between the side wheel and sparking wheel will depend on the pressure applied between them. Accordingly, in order to rotate the sparking wheel to generate sparks, a large pressure will have to be applied to the side wheel, making it difficult for the lighter to be ignited accidentally or by children.

[0007] Accordingly, the present invention provides a hand held lighter, comprising: a fuel container, a fuel valve for allowing fuel to be fed from the fuel container to an ignition point, a lever for opening the fuel valve, a rotatably mounted sparking wheel contacting the flint, so that when the sparking wheel is rotated, sparks are generated by the flint and projected to the ignition point, wherein there is at least one side wheel, rotatably mounted with respect of the sparking wheel, adjacent to the sparking wheel, the side wheel having an operating surface for engaging a user's thumb or finger to rotate the side wheel, the side wheel being configured to rotate the sparking wheel through frictional contact between a first, annular frictional surface of the at least one side wheel and a second, circumferential frictional surface formed on the outer edge of the sparking wheel and located within the annular surface of the at least one side wheel, the at least one side wheel being mounted on an axle, the first end of the axle being mounted in a bearing and a second end of the axle protruding into a bearing of the sparking wheel, characterised in that the axial length of the at least one side wheel being in the range of 0.5 to 1.5 times the axial length of the sparking wheel.

[0008] The method of using the hand held lighter of the present invention is generally the same as the prior art. However, a user has to apply a greater force to the at least one side wheel in order to cause the latter to rotate and generate sparks.

[0009] The frictional contact between the at least one side wheel and the sparking wheel may be provided by any suitable means. The at least one side wheel and the sparking wheel have contacting frictional surfaces. The frictional surfaces may be roughened to improve frictional contact. The frictional surfaces may lie in a plane at right angles to the axis of rotation of the at least one side wheel and the sparking wheel, but preferably, the frictional surfaces are parallel to the axis of rotation. In the invention when a user presses the at least one side wheel down to rotate it, the annular surface is pressed into contact with the circumferential surface of the sparking wheel, giving a frictional contact, the magnitude of frictional forces between the sparking wheel and the at least one side wheel depending upon the pressure applied.

[0010] Preferably, there are at least two side wheels, one located on each side of the sparking wheel. Preferably, there is a frictional contact between both side wheels and the sparking wheel.

[0011] The at least one side wheel is made of any suitable material, for example zinc alloy, stainless steel or brass. The at least one side wheel may be constructed of this material by any suitable method.

[0012] The at least one side wheel may be of any suitable shape. Preferably, it is part cylindrical. However, the circumferential sides may define sections of a cone. They may comprise curved sections. For example, the at least one side wheel may be formed with rounded edges. The

at least one side wheel is suitably of axial length in the range .5-5.0 mm, preferably around 1.0-2.0 mm.

[0013] Preferably, the sparking wheel and the at least one side wheels are substantially coaxially mounted.

[0014] The sparking wheel itself is preferably of conventional design, and details of the design will be well known to the person skilled in the art. It will be made of a suitable material, as will be well known to the person skilled in the art.

[0015] Preferably, the sparking wheel is configured so that there will be substantially no contact between it and the user's finger or thumb when the user operates the lighter. For example, the at least one side wheel may be of greater diameter than the sparking wheel so that it projects beyond it. Preferably, there are two side wheels of greater diameter than the sparking wheel, projecting beyond it. Alternatively, a structure which is fixed with respect to the at least one side wheel and the sparking wheel may project over the sparking wheel so that the user's thumb or finger does not contact it.

[0016] Preferably, the at least one side wheel and the sparking wheel are mounted in a bracket. The bracket suitably further comprises a mounting for the valve. The valve is preferably operable by a lever, a pivot point being provided in the bracket about which the lever may be rotated to actuate the valve. In this way, as is known in the art of the design of hand held lighters, the operating end of the lever may be mounted so that, in use, it can be contacted by the thumb at the same time as the thumb is used to rotate the sparking wheel, so that the lighter can be operated in a single movement. The part of the lever operable by the thumb will be called the free end. Preferably, resilient means are provided between the free end of the lever and the bracket. The resilient means is provided so that lever can only be operated, and the valve actuated, if sufficient force is applied by the thumb to overcome the resilient means. In this way, extra force is required in order to operate the lighter, providing a further safety feature.

[0017] The resilient means may take any suitable form. For example, the bracket may comprise a resiliently deformable projection. Alternatively, a compressible spring may be provided, for example a coil spring, extending between the free end and the bracket. A spring housing may be provided to house the spring.

[0018] The hand held lighter preferably comprises a shield. It is well known to provide a shield in hand-held lighters, extending around the ignition point, to prevent leakage of burning fuel from the ignition point and to protect the ignition point from draughts. In a preferred embodiment, the shield extends around the side of the sparking wheel. This provides a further safety feature. The operator has to insert their thumb between respective edges of the shield in order to operate the at least one side wheel.

[0019] The fuel container and shield design may be substantially the same as conventional hand held lighters. The valve may be substantially the same as in conventional hand held lighters. The fuel used may be the substantially the same as used in conventional hand held lighters. The flint may be any suitable flint material used in hand held lighters, and the person skilled in the art will be able to select suitable material.

[0020] The present invention will be further described by way of example only with reference to the accompanying drawings, in which:

Figure 1 is a cross sectional view through the hand held lighter according to the present invention with the lower part omitted.

Figure 2 is a part section along line II II of figure 1 of the lighter shown in figure 1, with the lower part omitted.

Figures 3, 4, and 5 each show an embodiment of a sparking wheel and side wheels for use in the lighter shown in figure 1.

Figure 6-10 show sketch side views of different types of side wheels for use in the present invention.

[0021] The lighter 1 shown in figure 1 comprises a fuel container 1, the lower part of which is omitted, but which is of normal design, but comprises fuel. A wick 3 is provided for allowing fuel to be delivered to a valve arrangement which includes a valve tube 4 movably located with respect to a valve plug 7 and a nozzle 5. The nozzle 5 defines the ignition point for fuel. There is a lever 6 for operating the valve arrangement. The lever 6 has a free end 6a, a pivoting section 6b (visible in figure 2), and a valve operating section 6c which engages an undercut formation formed at the base of nozzle 5. In use, if the free end 6a of the lever 6 is depressed, the lever 6 rotates about its pivot point 6b. This causes the operating section 6c to rise, drawing the nozzle 5 upwards with it. As a result, the valve tube 4 is drawn clear of the valve plug 7 and fuel is fed along the wick 3 from the container 1 and delivered to the nozzle 5. A spring 8 is provided for returning the valve to its closed position when the lever 6 is released. A sparking wheel 9 is provided. This is formed of a suitable material such as steel. The sparking wheel 9 is formed on its surface with indentations 9a to ensure a highly frictional contact with a flint 10. The flint 10 is driven into contact with the sparking wheel by a spring 11. The side wheel projects radially beyond the sparking wheel 9.

[0022] As can be seen in figure 2, the sparking wheel is associated with a pair of side wheels 12 and 13. The side wheels 12 and 13will be described further below. However, it can be seen that they each mounted on an axle 14,15. The outer ends of the axles 14 and 15 are retained in a bracket structure 16. The inner ends of the axles protrude into the bearing of the sparking wheel as will be described further below. The sparking wheel and the side wheels 12 and 13 are substantially coaxially mounted in the bracket structure 16. Each side wheel comprises an inwardly directed annular surface 18 which, in use, abuts the outer edge of the sparking wheel 9 in

frictional contact therewith.

[0023] A shield 17 is provided for protecting the nozzle 5. The shield is formed of metallic plate material and extends around the sparking wheel and the end of the nozzle. It can be seen that, the top edges of the shield 18 are bent over the top of the bracket structure 16 and abutt the sides of the side wheels 12 and 13 in figure 2.

[0024] Finally, a spring 11 mounted on a spring shaft 20 is provided. The end of the spring shaft 20 is urged against the free end 6a of the lever 6 biasing the free end into the upper position.

[0025] In use, a user places their thumb in contact with the side wheels 12 and, simultaneously, in contact with the free end 6a of the lever 6. If sufficient force is applied, the lever 6 is depressed, operating the valve 4 so that fuel is fed to the nozzle 5. Simultaneously, the side wheels 12 and 13 are rotated . If sufficient pressure is applied to the side wheels 12 and 13, their annular surfaces 18 are pressed into frictional engagement with the outer edge 19 of the sparking wheel 9, causing the sparking wheel to rotate. As a result, sparks are stricken from the end of the flint 10 to ignite the fuel. In order to prevent inadvertent operation of the lighter or to prevent operation of the lighter by children, the force required to rotate the sparking wheel is made sufficiently large.

[0026] It can be seen in figure 2 that the side wheels 12 and 13 are of greater of diameter than the sparking wheel and project beyond it by at least 2mm. Also, due to the fact that the edges of the sparking wheel 9 are contained within the annular surfaces 18 of the side wheel the exposed surface area of the sparking wheel is small. In use, when a user places their finger or thumb in contact with the side wheels, no contact will take place between the user's finger or thumb and the sparking wheel 9. Accordingly, the only rotational drive on the sparking wheel is derived through frictional contact between the annular surfaces 18 and the outer surface 19 of the sparking wheel.

[0027] Figure 3 is sketch cross sectional view through a first embodiment of a combination of side wheels and sparking wheel for use in figure 1. It can be seen that the sparking wheel 9 is mounted on an upstanding circular rib 20 located between the axles 14 and 15. The sparking wheel 9 is accordingly mounted firmly on the axles 14 and 15. It can be seen that there is a small gap between the inner surfaces of the side wheels 12 and 13 and the outer surfaces of axial discs 14a, 14b, 15a and 15b. This gap 21 prevents rotation of the axles 14 and 15 by the side wheel 12 and 13. Also the gap allows the side wheels 12 and 13 to be pressed radially downwards onto the axial discs as a result of which, the annular surfaces 18 of the side wheels 12 and 13 come into contact with the outer surface 19 of the sparking wheel, leading to frictional drive of the sparking wheel.

[0028] Figure 4 is a sketch cross section to another embodiment of a combination of side wheels and sparking wheel according to the invention. There are two side wheels 24 and 25 which are configured to engage with the outer surface 27 of the sparking wheel in the same way as figure 3. However, the side wheels 24 and 25 are mounted on axles 22 and 23 which have rims 22a and 23a with bevelled sides, which gives the side wheels 24 and 25 a self centring effect.

[0029] Figure 5 is a sketch cross section through an embodiment of a combination of side wheels and sparking wheel for use in figure 1. In this case, the side wheels 30 and 31 are retained on hubs 28a and 29a of the axles 28 and 29 respectively. Axial movement of the side wheels 30 and 31 is prevented in this case by the design of the bracket 16 shown in figure 2.

[0030] Figures 6 - 10 show various embodiments of side wheels for use in figure 1. The side wheel of figure 6 has an outwardly directed edge with teeth, to improve grip with a user's thumb or finger. It has inwardly directed annular edge 18 for engaging the outer surface of the sparking wheel 19. The inwardly directed edge is toothed as well, to give good frictional grip.

[0031] Figure 7 is a design of sign wheel which is similar to that shown in figure 6, except that the inwardly directed annular face 34 has a smaller number of teeth, of different design. This type of side wheel gives a lower degree of friction between the annular surface 34 and the outer surface of the sparking wheel 9. Accordingly, a stronger pressing force is required on the outside of the side wheel 12 to rotate the sparking wheel 9.

[0032] In figure 8, a side wheel 36 is shown which has a smooth annular surface 35. In this case, even greater force is required to be applied by a user's thumb or finger through the side wheel to cause the sparking wheel to rotate.

[0033] It is also possible as shown in figure 9 for the side wheel 37 to have a smooth outer surface as well as a smooth annular surface 38. Finally, it is possible as shown in figure 10 to have a smooth outer surface 39 and a toothed annular surface 40.

Claims

1. A hand held lighter (1), comprising:

a fuel container (2),
a fuel valve (4, 7) for allowing fuel to be fed from the fuel container (2) to an ignition point (5),
a lever (6) for opening the fuel valve (4, 7),
a rotatably mounted sparking wheel (9) contacting the flint (10), so that when the sparking wheel is rotated, sparks are generated by the flint and projected to the ignition point (5), wherein there is at least one side wheel (12, 13), rotatably mounted with respect of the sparking wheel (9), adjacent to the sparking wheel, the side wheel having an operating surface (19) for engaging a user's thumb or finger to rotate the side wheel, the side wheel being configured to rotate the sparking wheel through frictional contact be-

tween a first, annular frictional surface (18) of the at least one side wheel and a second, circumferential frictional surface (19) formed on the outer edge of the sparking wheel and located within the annular surface of the at least one side wheel,
the at least one side wheel being mounted on an axle (14, 15), the first end of the axle being mounted in a bearing and a second end of the axle protruding into a bearing of the sparking wheel, **characterised in that** the axial length of the at least one side wheel (12, 13) being in the range of 0.5 to 1.5 times the axial length of the sparking wheel (9).

2. A hand held lighter according to Claim 1, wherein there are at least two side wheels, one located on each side of the sparking wheel.

3. A hand held lighter according to any preceding claim, wherein the sparking wheel is configured with the at least one side wheel having a greater diameter than the sparking wheel so that there will be substantially no contact between it and the user's finger or thumb when the user operates the lighter.

Patentansprüche

1. Handfeuerzeug (1), umfassend:

einen Brennstoffbehälter (2),
ein Brennstoffventil (4, 7), um zu gewährleisten, dass Brennstoff aus dem Brennstoffbehälter (2) einer Zündstelle (5) zugeführt wird,
einen Hebel (6) zum Öffnen des Brennstoffventils (4, 7),
ein drehbar angebrachtes Funkenrad (9) in Kontakt mit dem Feuerstein (10), so dass bei einer Drehung des Funkenrads Funken durch den Feuerstein erzeugt und zur Zündstelle (5) geworfen werden, wobei angrenzend an das Funkenrad mindestens ein Seitenrad (12,13) drehbar in Bezug auf das Funkenrad (9) angebracht ist, das Seitenrad eine Betätigungsoberfläche (19) aufweist, mit der der Daumen oder der Finger eines Benutzers in Eingriff kommt, um das Seitenrad zu drehen, und das Seitenrad so angeordnet ist, dass es das Funkenrad durch Reibungskontakt zwischen einer ersten ringförmigen Reibungsfläche (18) des mindestens einen Seitenrads und einer zweiten, umlaufenden Reibungsfläche (19) dreht, die am äußeren Rand des Funkenrads ausgeformt ist und sich innerhalb der ringförmigen Fläche des mindestens einen Seitenrads befindet,
wobei das mindestens eine Seitenrad auf einer Achse (14,15) angebracht ist, wobei das erste Ende der Achse in einem Führungslager angebracht ist und das zweite Ende der Achse in ein Führungslager des Funkenrads hineinragt, **dadurch gekennzeichnet, dass** die axiale Länge des mindestens einen Seitenrads (12,13) um den Faktor 0,5 bis 1,5 größer ist als die axiale Länge des Funkenrads (9).

2. Handfeuerzeug nach Anspruch 1 mit mindestens zwei Seitenrädern, einem an jeder Seite des Funkenrads.

3. Handfeuerzeug nach einem der vorherigen Ansprüche, bei dem das Funkenrad so konfiguriert ist, dass das mindestens eine Seitenrad einen größeren Durchmesser hat als das Funkenrad, so dass im Wesentlichen kein Kontakt entsteht zwischen ihm und dem Finger oder Daumen des Benutzers, wenn der Benutzer das Feuerzeug betätigt.

Revendications

1. Briquet à main (1), comprenant:

un contenant pour combustible (2),
une soupape de carburant (4, 7) pour permettre au carburant d'être amené du contenant pour combustible (2) à un point d'ignition (5),
un levier (6) pour ouvrir la soupape de carburant (4, 7),
une molette à étincelles montée de manière rotative (9) en contact avec le silex (10), de sorte que lorsque la molette à étincelles est tournée, des étincelles sont générées par le silex et projetées vers le point d'ignition (5), dans laquelle se trouve au moins une molette latérale (12, 13) montée de manière rotative par rapport à la molette à étincelles (9), à proximité de la molette à étincelles (9), la molette latérale ayant une surface opérationnelle (19) pour recevoir le pouce ou un doigt d'un utilisateur pour faire tourner la molette latérale, la molette latérale étant configurée pour faire tourner la molette à étincelles par contact frictionnel entre une première surface annulaire de friction (18) de ladite au moins une molette latérale et une deuxième surface de friction circonférentielle (19) formée sur le bord extérieur de la molette à étincelles et située dans la surface annulaire de ladite au moins une molette latérale,
la au moins une molette latérale étant montée sur un essieu (14, 15), la première extrémité de l'essieu étant montée sur un palier et la deuxième extrémité de l'essieu faisant saillie dans un palier de la molette à étincelles, **caractérisé en ce que** la longueur axiale de la au moins une molette latérale (12, 13) représente entre 0,5 à

1,5 fois la longueur axiale de la molette à étincelles (9).

2. Briquet à main selon la revendication 1, dans lequel se trouvent au moins deux molettes latérales, situées sur chaque côté de la molette à étincelles.

3. Briquet à main selon l'une quelconque des revendications précédentes, dans lequel la molette à étincelles est configurée de sorte que la au moins une molette latérale a un diamètre supérieur à celui de la molette à étincelles de sorte qu'il n'y a aucun contact entre celle-ci et le doigt ou le pouce de l'utilisateur lorsque l'utilisateur utilise le briquet.

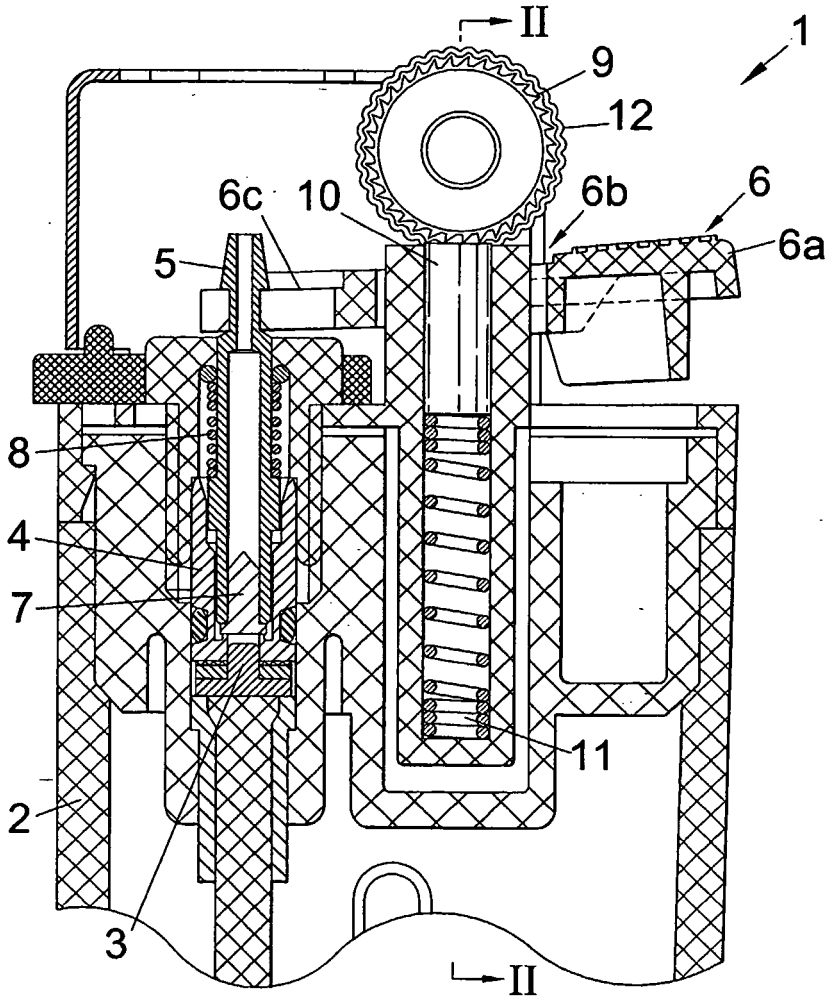


Fig. 1

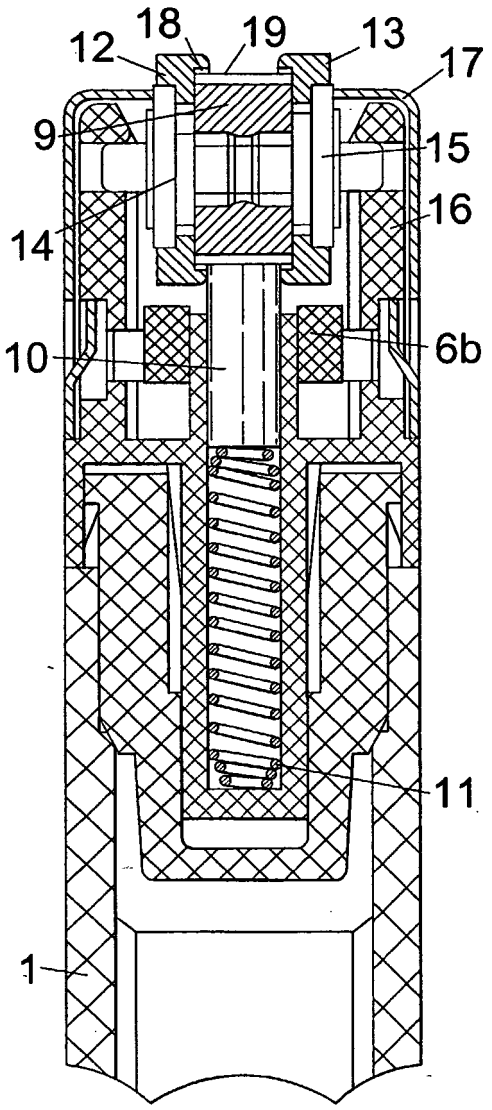


Fig. 2

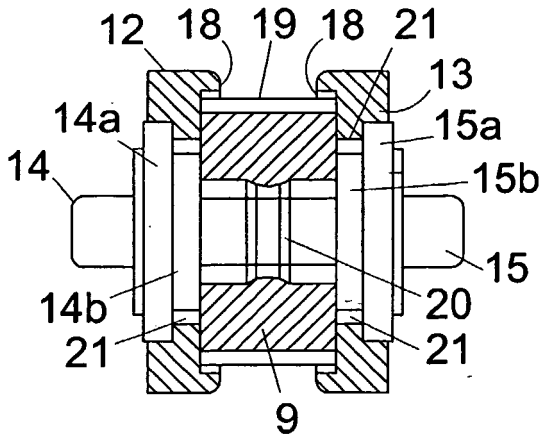


Fig. 3

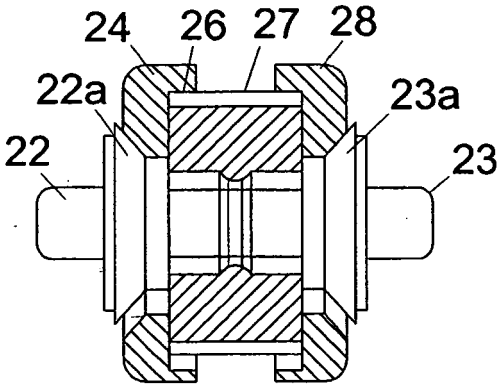


Fig. 4

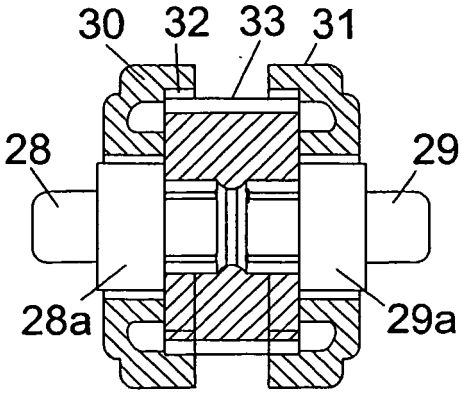


Fig. 5

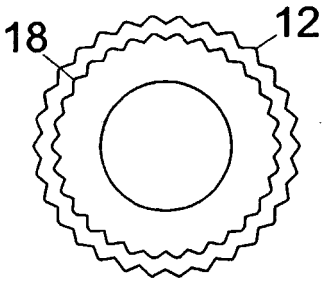


Fig. 6

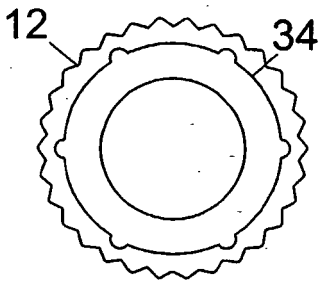


Fig. 7

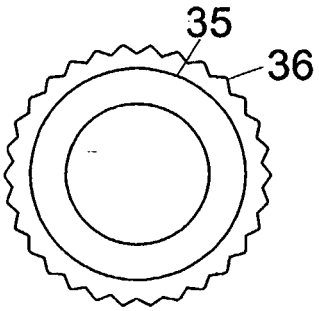


Fig. 8

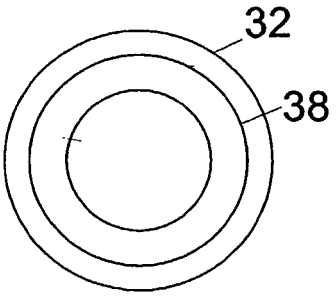


Fig. 9

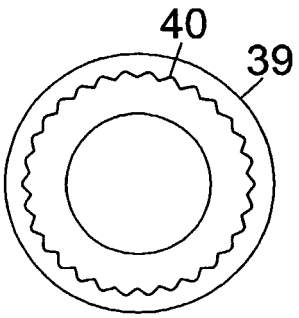


Fig. 10

REFERENCES CITED IN THE DESCRIPTION

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- US 5997281 A **[0003]**
- US 6146128 A **[0003]**
- CN 97219832 **[0003]**
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