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(54) **Blade-holder & bearing for an adjustable louvre system featuring high torque characteristics**

Jalousienlamellenhalter und Lager für ein einstellbares Jalousiesystem aufweisend hohe Drehmomentcharakterisitik

Support de lame et palier pour une système ajustable de jalousie ayant pour caractéristique un couple élevé

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(73) Proprietor: **A.C. Technometal Ltd.**
2090 Nicosia (CY)

(72) Inventor: **Constantinides, Yiannis**
Nicosia (CY)

(74) Representative: **Haley, Stephen**
Gill Jennings & Every LLP
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

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Description

[0001] The invention relates to a blade holder and bearing assembly to be incorporated in louver systems of the type having adjustable blades, which features high strength against torque loads and ease of assembly in the manufacturing process, such a blade holder and bearing is known from US 4 643 081 A which discloses the preamble of claim 1.

[0002] Systems of the type, having adjustable blades, which can be angled at will, are very popular in regulating wind flow and sun block in buildings. The most common embodiment of such a system is one that consists essentially of two adjacent upright metal U shaped members, which hold plastic or metal swivel blade-holders in which the blades are inserted to form a single assembly. The blade-holders are free to rotate on their own horizontal axis when located on the U-shaped member. The synchronized movement of all the blade-holders is powered via two connecting rods that move vertically. The blade-holders are supported on the U-shaped member via bearings that clip onto the blade-holders and in doing so leave the U-shaped member locked in the middle. Note that the connecting rods are loosely riveted on the bearings so as to allow the relative movement of the one against the other. As a result the vertical movement of the connecting rods is translated into rotational motion on the bearing. Since each bearing is joined with a corresponding blade-holder and the latter holds the blade axial rotation of the blades is achieved. The vertical movement of the bars, which results in the rotation of the blades, is usually achieved via a worm gear system or via a linkage mechanism that is connected to a handle. An illustration of such a system is found in Fig 1.

[0003] Systems of the type described above suffer from two technical drawbacks. Both of these problems relate to the high dependence of the system on the blade-holder and bearing assembly.

[0004] The first drawback relates to the relatively low value of the maximum torque characteristics of the system. Since the movement of the blades originates from the vertical movement of the connecting rods, which in turn drive, the bearing, which is jointed on the blade-holder, this means that to a large extent the torque characteristics of the system are limited by the strength of the blade-holder and bearing joint. In the current state of the art, the blade-holder and bearing joint is achieved via a male polygon member being inserted inside a female polygon socket and a clip mechanism that stops them from sliding against each other after the insertion has occurred. In some blade-holder and bearing joints the male polygon member is part of the blade-holder and the female polygon socket is part of the bearing and in other joints the other way round. The cause of this drawback originates from the fact that when elevated torque is applied on the blade-holder and bearing joint the male polygon member is forced to rotate inside the female polygon socket and this results in the eventual destruction of the male or/and female polygon corners and the disengagement of the clip mechanism leading to the dismantling of the joint. When this happens the blade-holder no longer engages with the bearing and it is free to rotate on it own or even be removed from the louver system along with the blade leaving an unsecured hole. In the current state of the art, the blade-holder and bearing torque characteristics are limited by the material flexibility of the male polygon member and/or the female socket, which is inherently low since either one of them or both of them are made of a synthetic material which needs to posses good flexibility characteristics so as to serve other design purposes such as the clip mechanism and blade holding.

[0005] Being able to create a high torque blade-holder and bearing joint is very important for many reasons. For example it improves the louver system in terms of security against potential burglars by increasing the amount of leverage power required to disengage a blade-holder from the bearing while the connecting rods are secured on a fixed position and thus remove a blade from the louver mechanism.

[0006] In addition since the rotational motion of the blade-holder is transmitted via the bearing, having a high torque joint between them ensures many years of trouble free operation. This is very important in cases where the blades are improperly cut, which can place excessive torque loadings on the joint to achieve rotation.

[0007] Having a high torque joint is also very important in achieving the tight closing of the blades against water, air and dust. Since the blades are equipped with rubber seals, at the end of their rotational cycle an increased amount of torque is required to achieve the pressing of the seals so that the blades reach the end of their rotational cycle.

[0008] Being able to have a high torque blade-holder and bearing joint is also very important in cases where the louver system is powered via an electric motor. Although some motorized systems incorporate mechanical limit switches the majority of motorized systems use electrical limit switches. For the electrical limit switch to activate there should be a sharp rise in electrical current, which takes place when the motor torque rises. The required rise in torque occurs when the blade-holder reaches the end of its rotation and applies a break on the motor. Since the motor is still applying rotational power, prior to the activation of the electrical limit switch, an opposite reaction to this power comes from the blade-holder and bearing joint. If this is not a high strength joint then the operational life of the system is greatly reduced.

[0009] The second drawback originates from the fact that it is technically difficult to assemble the bearing with the blade-holder. This is because prior to the assembly the bearing and the blade-holder have to be properly aligned on top of each other. In the current state of the art this is technically difficult to achieve without the requirement of special purpose assembly machines due to the inherent design of the clip mechanism that gets in

the way and does not allow the ease of orientation of the blade-holder on the bearing prior to the insertion to form the joint.

[0010] Since louver systems are required in numerous sizes depending on the window size it is very difficult and costly to keep adequate stocks on an international basis to serve each local market. For this to be carried out economically and efficiently the assembly of the mechanisms must be performed locally to each market. However this requires the setup of special assembly machines at each site, which is technically difficult to maintain.

[0011] The object of this invention described herein is that of eliminating the drawbacks outlined. The stated object is realized with a blade-holder and bearing as described in the following specification and as characterized in the appended claims that fits common types of louver systems as described earlier and allows a high torque joint of the blade-holder on the bearing which is easy to assemble without the need of special machines or time consuming manual operations. The key to this invention is the simplicity in terms of design, construction and assembly that results in lowering the cost of investment and production.

[0012] Accordingly, this invention provides a blade-holder consisting of a blade socket on the one side and on the other side a central male polygon member with chamfered tip equipped with guiding grooves leading to ramps followed by two openings that reveal catches, surrounded by a female polygonal socket.

[0013] In addition it provides a bearing characterized by a circular plate consisting on the one side two projecting pins and on the other side a central female polygon socket surrounded by a male polygon member part of which consists of two projecting flexible legs equipped with hooks.

[0014] Preferably the blade-holder and the bearing are made out of a plastics material but the blade-holder may instead be made from a rigid material such as metal.

[0015] A preferred embodiment of the invention will now be described by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is an exploded view of the essential parts of a louver system with adjustable blades of the type that this invention applies to;
Fig. 2 is the top and bottom views of the blade-holder;
Fig. 3 is the top and bottom views of the bearing;
Fig. 4 shows a section of the blade-holder and bearing assembly according to the invention, viewed from the side and in isolation from the fixture with emphasis on the creation of the high torque joint;
Fig. 5 shows a section of the blade-holder and bearing assembly according to the invention, viewed from the side and in isolation from the fixture with emphasis on the clip mechanism; and
Fig. 6 shows a section of a blade-holder and bearing according to the invention, viewed from the side and in isolation from the fixture prior to the assembly in full orientation against each other.

[0016] Fig. 1 provides an illustration of a typical louver system with adjustable blades, which is limited to a pair of U-shaped members 1, a blades 2 with respective blade-holders 3, bearings 4 and two connecting rods 9.

[0017] Along the length of each U-shaped member 1 there are a series of holes 5 at constant intervals that are used for holding the blade-holder 3 and bearing 4 assembly which in turn is used to hold the blade 2. So in effect when placing a set of U-shaped members 1 facing each other with the blade-holder 3 and bearing 1 assemblies completed, the blades 2 can be located in the blade-holders 3 thus creating an adjustable louver system.

[0018] The blades 2 in the example illustrated are made out of extruded aluminum but that does not have to be the case. They could be made out of a plastics material, wood, glass or any other rigid material.

[0019] The top part of the blade-holder 3 consists of a blade socket 28 which is similarly shaped as the blades 2 to allow a tight fit, which can be secured via a clip mechanism.

[0020] On the rear side of each bearing 4 two pins 8 are projecting which are used for engaging the connecting rods 9 and are locked via a riveting operation 10.

[0021] When the blade-holder 3 is assembled with the bearing 4 a collar is formed 11 that is marginally less than the hole 5 in the U-shaped member 1 thus allowing the blade-holder and bearing assembly to freely rotate in respect with the U-shaped member 1. This rotation is generated via the linear movement of the connecting rods 9. The linear movement of the connecting rods 9 can be generated via a worm gear mechanism or a linkage mechanism connected to a lever.

[0022] Figure 2 shows top and bottom views of a blade-holder according to the invention. It is important to note that this blade-holder consists of a central male component 14, a perimeter female socket 13 and a set of alignment guides 20 leading to a set of openings 21 that reveal a set of inclined clip seats. Note that in this illustration the male components and female sockets are in a quadrangular configuration but this innovation is not restricted to only this type of polygon.

[0023] Figure 3 shows top and bottom views of a bearing 4 according to the invention. It is important to note that the illustrated bearing is essentially a circular plate consisting on the one side two projecting pins 8 and on the other side a central female polygon socket 22 surrounded by a male polygon member 23 part of which consists of two projecting flexible legs 24 equipped with hooks 26.

[0024] Figure 4 shows a section of the bearing 4 and a section of the lower part of the blade-holder 3 in an assembly configuration on a U-shaped member 1 forming a high strength joint. It is important to note that the bearing 4 male polygon element 23 engages in the blade-holder 3 female polygon socket 13 and also the bearing

4 female polygon socket 22 engages in the blade-holder 3 male polygon element 14, thus forming a high torque joint. This type of joint can withstand much greater torques than current state of the art blade-holder and bearing joints. In current state of the art joints the blade-holder 3 and the bearing 4 have either a male or a female component. They do not have both. Current state of the art joints subjected under high torque fail to sustain the load because the male component forces the female socket to expand, by virtue of the flexibility of the material and socket design this is easy to do, and thus allow the male component to rotate within the female socket resulting to the destruction of both the male and female polygon corners leading to the disengagement of the joint. However in the case of a high torque joint, as shown in figure 4, in order for the male polygon component 14 to rotate inside the female socket 22 the bearing male component 23 must be compressed against the blade-holder 3 female socket 13 to allow this rotation. In effect the amount of torque that the blade-holder and bearing joint can withstand is not actually dependant on the construction of the socket but on the bearing material compression characteristics, which are typically much higher that any socket design can offer.

[0025] Figure 5 shows another section view of the bearing 4 and section view of the lower part of the blade-holder 3 in an assembled configuration on U-shaped frame 1 forming a high strength joint with emphasis on the clip mechanism. When sliding the bearing 4 inside the blade-holder 3 the two legs 24 bend outward to allow the blade-holder 3 central section 14 to locate itself below the legs 24. Each leg is equipped with a lip 25 which part of it forms a catch 26 that will anchor on the blade-holder 3 central section part 27 in case an attempt is made to disengage the blade-holder 3 from the bearing 4 or slide the one against the other.

[0026] Current state of the art blade-holder and bearing designs are equipped with flat lips that do not have the ability to anchor themselves when pulled out, resulting in low pulling power requirements to take them apart.

[0027] Figure 6 shows the way in which the bearing 4 is freely aligned against the blade-holder 3 prior to the application of pressure to achieve the insertion of the one into the other. As shown in figure 6 the legs 24 slide along guides 20 provided by the blade-holder 3 with adequate clearance to allow free movement and self alignment. Having moved a certain distance the blade-holder 3 reaches a point where its male component 14 forms a tight fit with the bearing socket 22 and as a result requires additional pressure to move forward. At this point the bearing 4 sits aligned with respect to the blade-holder 3 and is ready to be inserted either by hand or via an automatic pressure device.

Claims

1. A blade holder and bearing assembly, for use in a louver system, the blade-holder (3) comprising a blade socket (28) on one side and on the opposing side a male component (14), the blade holder **characterised in that** it also comprises on the opposite side a female socket (13) , the male component (14) and the female socket (13) being one inside the other, and a set of alignment guides (20) leading to a set of holes (21) that reveal a set of inclined clip seats (27), to engage, in use, with a louver blade; and
the bearing (4) comprising a circular plate consisting on one side of two projecting pins (8) and on the other side a female socket (22) and a male member (23) part of which consists of two projecting flexible legs (24) equipped with hooks (26), the female sockets and male members of the blade holder and bearing being positioned and arranged to engage with one another in use.

2. A blade-holder and bearing assembly as claimed in claim 1, further comprising with a self alignment mechanism that allows the ease of assembly of the blade-holder (3) with the bearing (4).

3. A blade-holder and bearing assembly as claimed in claim 1 or 2 provided with a retaining mechanism that does not allow the disengagement or lateral movement of the bearing (4) with respect to the blade-holder (3) once they have been assembled together.

4. A blade holder and bearing assembly according to any preceding claim, wherein the bearing is made from a plastics or synthetic material, provide sufficient flexibility to the legs (24) to allow proper engagement with the blade-holder (3).

5. A blade-holder and bearing assembly according to any preceding claim, wherein the blade-holder is made from a plastics or rigid material to allow proper engagement with the bearing (3).

Patentansprüche

1. Lamellenhalter und Lageranordnung für die Verwendung in einem Jalousiesystem, wobei der Lamellenhalter (3) eine Lamellenfassung (28) auf einer Seite und ein Steckteil (14) auf der gegenüberliegenden Seite enthält, **dadurch gekennzeichnet, dass** er auf der gegenüberliegenden Seite eine Aufnahmefassung (13) enthält, wobei das Steckteil (14) und die Aufnahmefassung (13) ineinander angeordnet sind, und einen Satz Ausrichtführungen (20), die zu einem Satz Löchern (21) hinführen, die einen Satz geneigter Klemmensitze (27) bilden, um im Gebrauch mit einer Jalousielamelle zusammenzuwirken; und
das Lager (4) eine kreisförmige Platte enthält, die

auf einer Seite zwei vorstehende Stifte (8) und auf der anderen Seite eine Aufnahmefassung (22) und ein Stekkelement (23) hat, von dem ein Teil aus zwei vorstehenden, flexiblen Zungen (24) besteht, die mit Haken (26) versehen sind, wobei die Aufnahmefassungen und die Steckelemente des Lamellenhalters und des Lagers so positioniert und angeordnet sind, dass sie im Gebrauch ineinandergreifen.

2. Lamellenhalter und Lageranordnung nach Anspruch 1, weiterhin enthaltend einen Selbstausrichtmechanismus, der das einfache Zusammensetzen des Lamellenhalters (3) mit dem Lager (4) ermöglicht.

3. Lamellenhalter und Lageranordnung nach Anspruch 1 oder 2, mit einem Haltemechanismus, der ein Lösen oder eine seitliche Bewegung des Lagers (4) gegenüber dem Lamellenhalter (3) verhindert, sobald sie zusammengesetzt worden sind.

4. Lamellenhalter und Lageranordnung nach einem der vorhergehenden Ansprüche, bei dem das Lager aus einem Kunststoff oder synthetischen Material besteht, das den Zungen (24) ausreichend Flexibilität verleiht, um ein ordnungsgemäßes Verbinden mit dem Lamellenhalter (3) zu ermöglichen.

5. Lamellenhalter und Lageranordnung nach einem der vorhergehenden Ansprüche, wobei der Lamellenhalter aus einem Kunststoff oder einem steifen Material besteht, um eine ordnungsgemäße Verbindung mit dem Lager (3) zu ermöglichen.

Revendications

1. Ensemble de porte-lame et de palier destiné à être utilisé dans un système de persienne, la poignée (3) de lame comprenant une douille de lame (28) sur un côté et un composant mâle (14) sur le côté opposé, le porte-lame étant **caractérisé en ce qu'**il comprend aussi sur le côté opposé une douille femelle (13), le composant mâle (14) et la douille femelle (13) étant emboîtés l'un dans l'autre et un ensemble de guides d'alignement (20) menant à un ensemble de trous (21) qui révèlent un ensemble de sièges d'agrafe inclinés (27) qui en utilisation engagent une lame de persienne,
le palier (4) comprenant un plateau circulaire qui consiste sur un côté en deux goujons (8) en saillie et sur l'autre côté en une douille femelle (22) et un élément mâle (23) dont une partie consiste en deux bras flexibles (24) en saillie dotés de crochets (26), les douilles femelles et les éléments mâles du porte-lame et du palier étant positionnés et agencés de manière à s'engager mutuellement en utilisation.

2. Porte-lame et ensemble de palier selon la revendication 1, comprenant de plus un mécanisme d'autoalignement qui permet de faciliter l'introduction de l'ensemble constitué du porte-lame (3) et du palier (4).

3. Ensemble de porte-lame et de palier selon les revendications 1 ou 2, doté d'un mécanisme de retenue qui ne permet pas le désengagement ou le déplacement latéral du palier (4) par rapport au porte-lame (3) une fois qu'ils ont été assemblés.

4. Ensemble de porte-lame et de palier selon l'une quelconque des revendications précédentes, dans lequel le palier est constitué de matière plastique ou synthétique et donne aux bras (24) une flexibilité suffisante pour permettre un engagement correct sur le porte-lame (3).

5. Porte-lame et ensemble de palier selon l'une quelconque des revendications précédentes, dans lequel le porte-lame est constitué d'une matériau plastique ou rigide qui permet un engagement correct avec le palier (3).

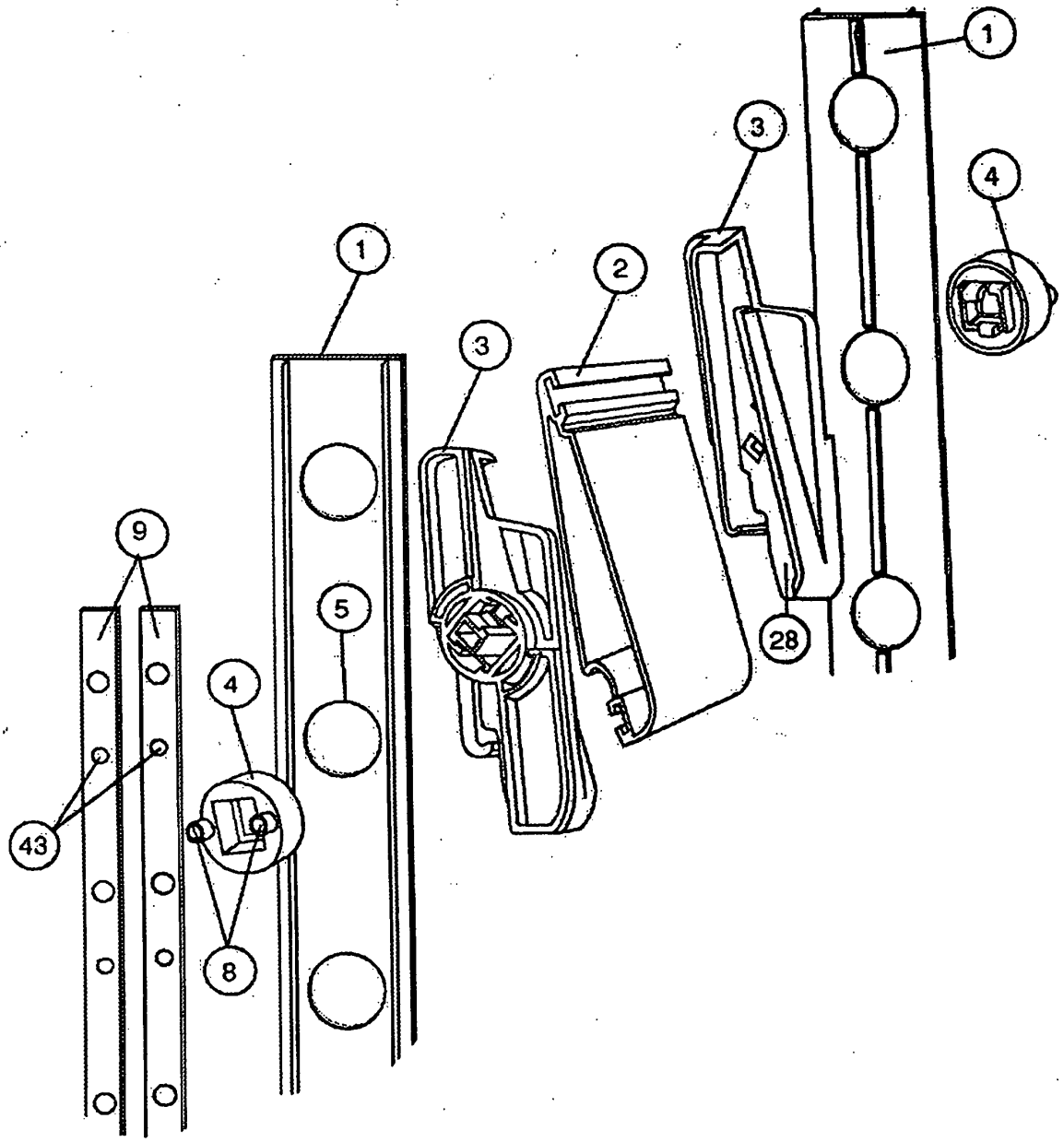


Fig 1

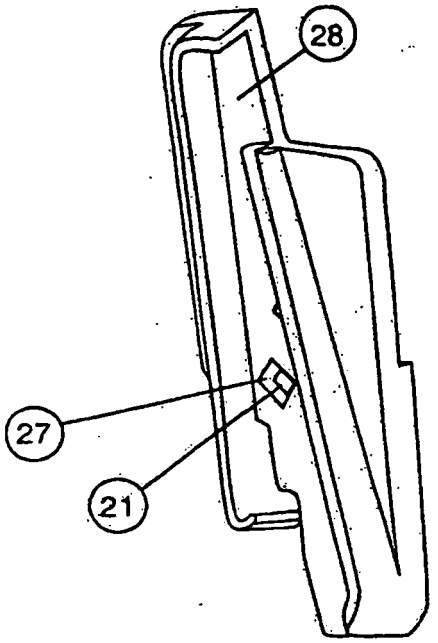


Fig 2(a)

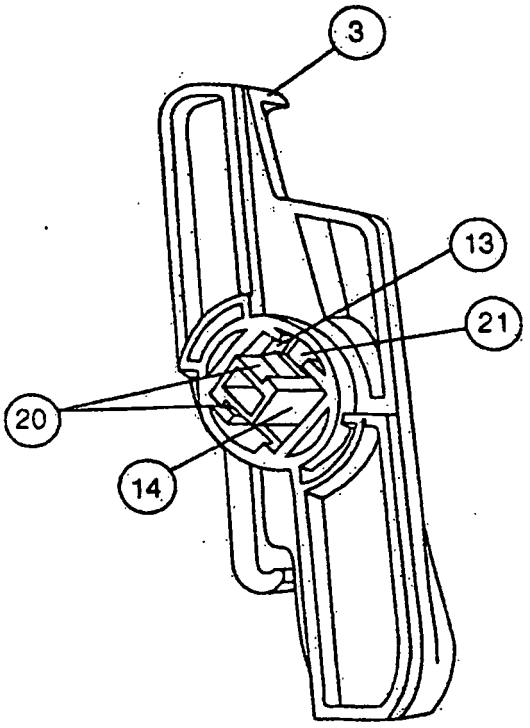


Fig 2(b)

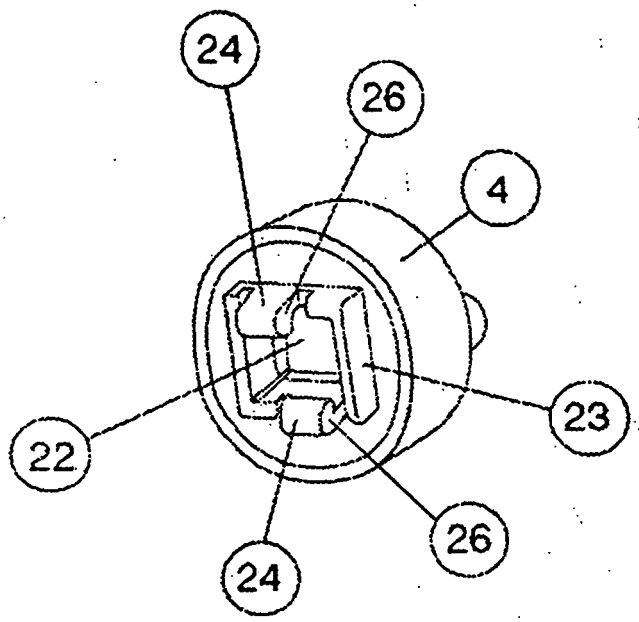


Fig 3(a)

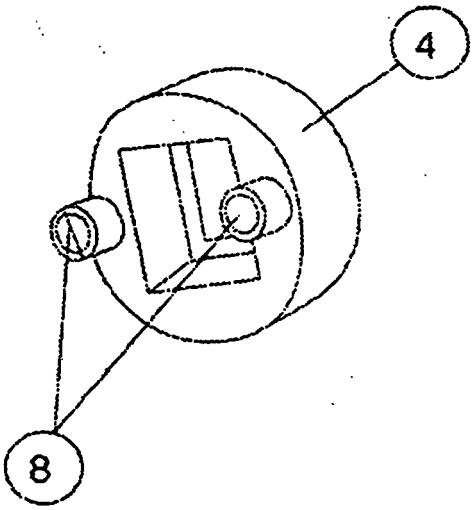


Fig 3(b)

FIG 4

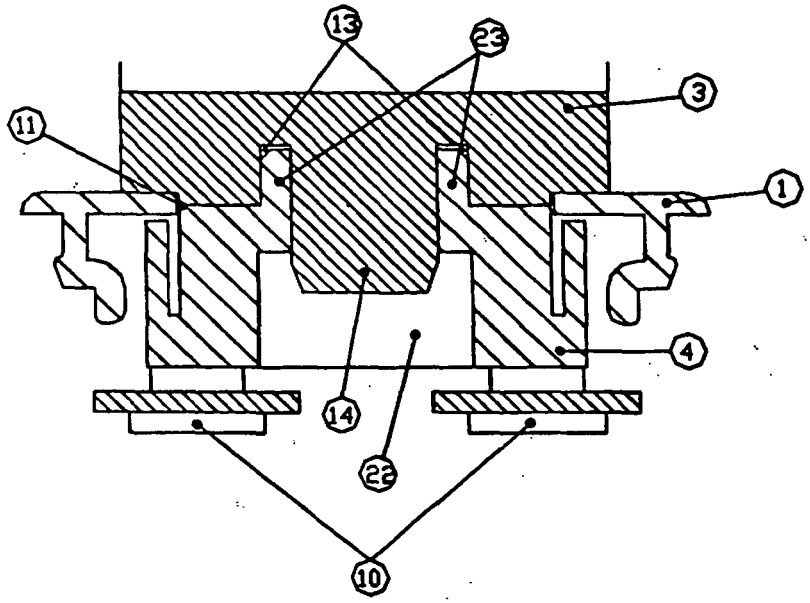


FIG 5

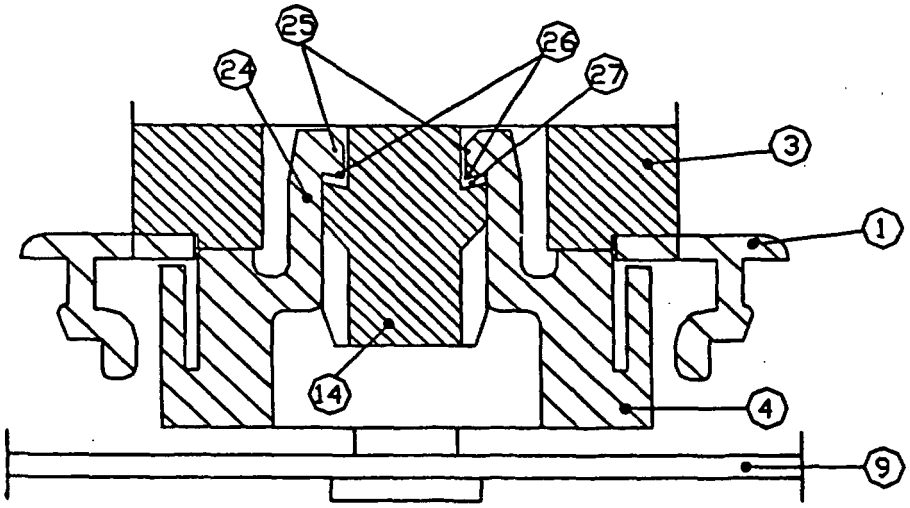
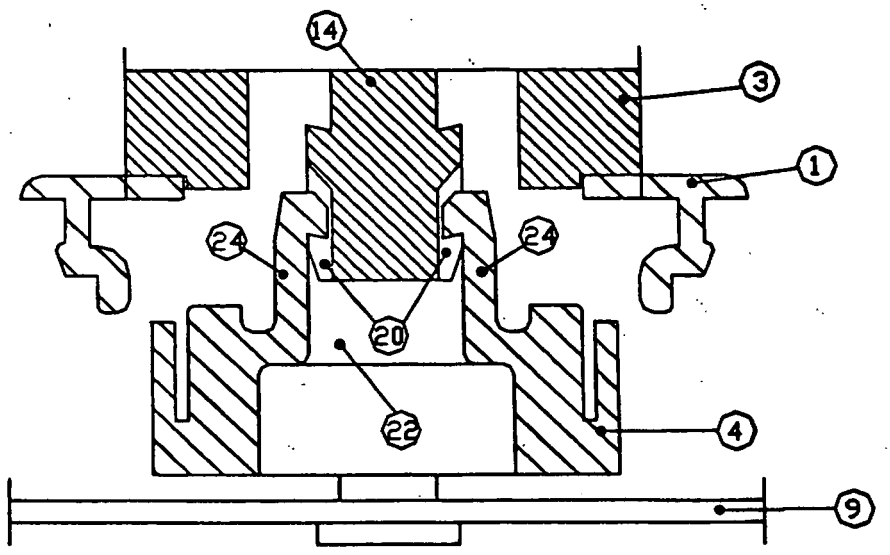


FIG 6



REFERENCES CITED IN THE DESCRIPTION

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