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(54) **DEVICE FOR CHECKING AND REGULATING WIRE WHEELS**

VORRICHTUNG ZUR ÜBERPRÜFUNG UND REGELUNG VON DRAHTSPEICHENRÄDERN
DISPOSITIF DE VERIFICATION ET DE REGLAGE POUR ROUES A RAYONS

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Description

[0001] The present invention is about a device for checking and regulating alloy and steel tubeless wire wheels, (we use the term "wire wheels" or "wire rims" to indicate those spoke wheels similar to bicycle wheels) which allows the tuning, set up, rims substitution, and spoking, tensioning and centering of said wheels' spokes with utmost precision, with a quick, easy, and inexpensive system that allows the service and repair shops to fix the dents and tune up such wheels (see for example JP-A-63 008 002).

[0002] The use of alloy or steel tubeless wire rims has created some kinds of wheels which need an accurate and utmost precise maintenance to be carried out frequently according to the run mileage. They are used on *maximotos* with considerable performances, same as for bicycles and automotive vehicles. At the moment, this kind of equipment apparently does not exist.

[0003] A small hit or a pothole can produce radial dents or axial misalignments which even if of reduced size could cause serious riding and safety problems to such vehicles. For example, a dent on the edge in addition to causing the tire to deflate which is very dangerous on the run, also makes the wheels to loose their balance and to misalign that particularly affects the stability, already precarious, of two wheels vehicles causing characteristic and dangerous waving, besides bringing about the loosening or breaking of the spokes.

[0004] As far as we know, presently this kind of apparatuses does not exist, and even the makers' branches and dealers do not have the equipment for performing such tasks.

[0005] The device according to the present invention brilliantly solves these problems and it is made of a supporting framework for a drilled table where at its center an adjustable or custom positioning flange of the wheel's rim is mounted in order to carry out the tensioning and centering check up of the wheel's spokes.

[0006] The main characteristics of the apparatus are indicated in claim 1, and further useful particulars are recited in the dependent claims.

[0007] Such features, as well as advantages and objects of the apparatus according to the invention will be clear and obvious from the following detailed description, made with reference to the annexed drawings wherein a preferred embodiment is shown in an explanatory but not limiting way, in which:

Figure 1 is a plan view of the table for a wire tubeless wheel with a system for the fixing of the spokes on the rim's outer ring;

Figure 2 is a sectional side view of the table of figure 1 showing the wheel's set up;

Figure 3 is a perspective view of the supporting framework or bed of the table;

Figure 4 is an enlarged section along the line 4-4 of Figure 3 showing the friction fixing of the table;

Figure 5 is a plan view of the revolving table with a system for the fixing of the spokes on the hub's center;

Figure 6 is a sectional side view of the table of Figure 5 showing the set up of a BMW motorbike's back wheel;

Figure 7 is a sectional side view similar to Figure 6 showing the set up of a BMW motorbike's front wheel;

Figure 8 is a sectional side view similar to Figures 6 and 7 for a BMW motorbike's wheel with a built-in bearing of the brake disc; and

Figures 9 and 10 show two alternative systems of dents' straightening.

[0008] Making now reference to the annexed drawings' figures, the structure of the device will be described together with its operation for its better and more immediate understanding.

[0009] The tubeless rims will be specifically considered for the wire wheels however the same system is applicable also for the conventional spoke rims even if adopting different reaction systems to the adjustment.

[0010] The tubeless rim which some brand names like Aprilia, BMW, Guzzi and others, use on endurance or chopper models is taken as reference; in this first case the example refers to the front and back wheels of a BMW GS model, which use a tubeless rim with the spokes fixing on the rim's outer edge and the adjustment occurs inside the hub.

[0011] Until now, the operations of substitution and of centering and tensioning adjustment were carried out manually with unsafe and poor results, and with a not homogeneous tensioning that would often cause the rims to break and the nipples to unfasten during the ride besides the axial and radial misalignment. The alternative was the costly substitution of the entire rim. Furthermore the ordinary maintenance becomes easier and improves with the use of the invented device.

[0012] For this reason the device has been assembled based on the coplanar position of the hub-brake disc support and the rim's plane. For example, the device (BMW) (Aprilia with the system of nipples fixing on the outer ring) is made of an anti-scratch table 50 centrally drilled 52 whereon a flange 54 is mounted of such a thickness to allow the outer ring 56 of the rim 58 to be kept in the axial center line position relative to the hub 60 that for instance in the back wheel turns out to be misaligned with respect to the hub. In the front wheel, because the fixing plane is tipping, the plane was made in a way that it would be automatically found in the center line of the hub/rim by using the same flange.

[0013] Regarding the fixing plane, the thickness and the diameter are adapted to the rim to be treated taking also into consideration the fixing to the outer rim's plane once centered with the proper instrument shown in the drawings, the central hole 52 adapted to the flange 54 on which the hub is fixed through the holes 62 of the

brake disc which are perfectly flat and perpendicular to the hub's hole (wheel center), an excellent reference for the outer rim for all the adjustments and centering in the various desired positions, with a number of holes and stirrup system 63 of the external diameter on the plane. For special wheels with built-in bearings of the brake disc the linings 65 are used which displace the centering of the hub to the rim's center line.

[0014] The plane rotates in the desired positions, is tipped of 180° and rotates for 360° using as fulcrum two points 64 of the external diameter with a system of fixed blockings 66 and friction 68 as needed by the supporting framework or bed 69.

[0015] The turning and the tipping allow the adjustment of the nipples 70 which are found inside the hub from both sides, they act on the spokes 72 and consequently they center the rim 58 with respect to the hub 60 in the various axial, radial and of center line positions.

[0016] The system of centering checking in the two positions is a T shaped structure 74 which inserts itself with the vertical part 76 into the hub's central hole, the conventional wheel's center, it gets fixed into the desired point with the ring nut 77 and then goes on to the radial centering and checking first making a rotating pin 78 turn around the rim adjusting the position through the fixing 80 on the horizontal guide 82 of the T shaped structure, subsequently the operation is completed with the test indicator 84 by adjusting the length (3.14 radius) of the spokes 72 paying attention to tighten first those spokes which pull towards the face, while if one does the inverse process the rim's center line would move upward because being the rim free it would not meet any resistance to such displacement. Nevertheless the entire process can be carried out anyway with the sole assistance of the feeler pins without using the test indicator.

[0017] Once the desired radial centering is achieved, the rim's adhesion to the (axial) plane is checked throughout the whole circumference with a thickness gauge or at sight and the edge gets fixed with clamps to the plane.

[0018] Next the needed adjustment and tensioning is made with a dynamometric wrench, the whole operation being carried out by using commercial systems. The process can also be displayed on PC and then printed out.

[0019] In the end everything gets freed and the final check up is done with the test indicators in the positions to be checked by using a system of the manual balancing type or by fixing the rim into an apparatus for repairing and servicing of vehicles' spoke wheels rims which is part of another patent by the applicant.

[0020] Other systems to straighten dents, both axial and radial, consist of a system headed towards the desired direction which, pushed by a hydraulic piston 46, generates a thrust of the head 48 in the desired point (Figure 9) or else by a cam 41 which gets driven to rotate by pushing a rod 42 with the head 44 against the dented part (Figure 10).

[0021] If needed, such dented spot will be heated at

controlled temperature thus making the material malleable enough, without exceeding, taking into consideration that the materials of modern wheels which are used in this operation are usually very weak and sensible to thermal treatments.

[0022] However, the fixing of the rim on the table can be carried out in several ways, with clamps, rings, flanges, and hydraulic or mechanical systems.

[0023] It is thus understood from what has been previously described that a strong, reliable and resistant device has been manufactured, which allows to carry out such checking and set up in a quick and effective fashion and most of all with great precision, getting rid of the flaws of the trial and inexact systems used up to now.

[0024] At last, it must be emphasized that several modifications, additions and/or substitutions of elements could be made to the invented device, without departing from its spirit and without as well falling out of the scope of protection, as also indicated in the appended claims.

Claims

1. A device for checking and regulating tubeless wire wheels, **characterized in** comprising a supporting framework or bed for a turning and tipping centrally drilled table, on which a wheel's rim center line positioning flange of variable height is mounted in order to carry out the checking and centering of the wheel's spokes.
2. The device according to claim 1, **characterized in that** the table is supported by the bed through a revolving pivot which allows the table to rotate and to lock it in the desired position.
3. The device according to claim 2, **characterized in that** the two table's sides are used as a face as well as reference for the set up of the various kinds of wheels wherein the spokes are arranged according a different configuration.
4. The device according to claim 1, **characterized in that** the table is star shaped with protrusions, in order to block the wheels with the spokes fixed onto the rim's outer ring.
5. The device according to one of the previous claims, **characterized in that** the checking is carried out through a system of feeler pins and test indicators adjustably fixed to revolving arm attached to the pivot of the locking hub of the wheel to the table.
6. The device according to one of the previous claims, **characterized in** providing linings of variable height in order to move the hub's center line onto the face.
7. The device according to one of the previous claims,

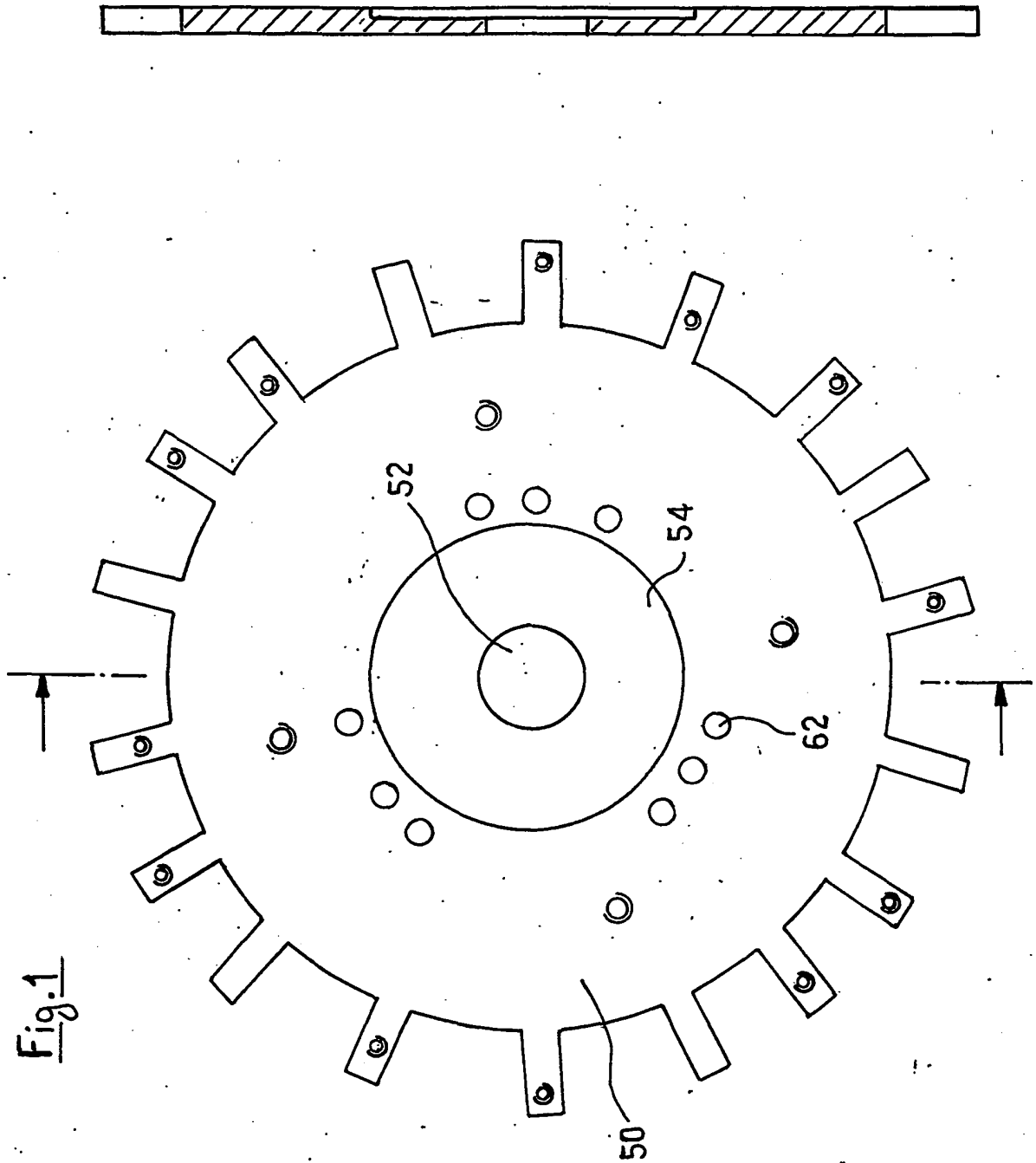
characterized in that the set up of the spokes' centering is carried out by adjusting their length and by tightening the respective tension rods, set by the reference plane.

Patentansprüche

1. Vorrichtung zum Überprüfen und Regulieren schlauchloser Drahräder, **dadurch gekennzeichnet, dass** sie einen Trägerrahmen oder Bett für einen drehenden und kippenden, in der Mitte durchbohrten Tisch aufweist, auf den ein Positionierflansch variabler Höhe einer Radfelgen-Mittellinie montiert ist, um die Überprüfung und Zentrierung der Radspeichen durchzuführen. 10
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Tisch von dem Bett mittels eines Drehzapfens getragen wird, der eine Drehung des Tisches und seine Verriegelung in der gewünschten Stellung erlaubt. 15
3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die zwei Tischseiten sowohl als Fläche als auch als Bezug für die Anordnung der verschiedenen Arten von Rädern verwendet wird, wobei die Speichen gemäß einer unterschiedlichen Konfiguration angeordnet werden. 25
4. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** der Tisch sternförmig mit Vorsprüngen ist, um die Räder mit den Speichen am Außenring der Felge fixiert zu blockieren. 30
5. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Überprüfung mittels eines Systems von Tastnadeln und Testanzeigern durchgeführt wird, die einstellbar an einem Dreharm befestigt sind, der am Drehzapfen der Verriegelungsnabe des Rads am Tisch befestigt ist. 35
6. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** Beläge verschiedener Höhe vorgesehen werden, um die Mittellinie der Nabe auf die Fläche zu bewegen. 40
7. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Anordnung der Zentrierung der Speichen durch Anpassen ihrer Länge und durch Festziehen der verschiedenen Spannstangen durchgeführt wird, bestimmt durch die Bezugsebene. 45

Revendications

1. Dispositif de contrôle et de régulation de roues métalliques à chambre incorporée, **caractérisé en ce qu'il** comporte un cadre ou banc support pour faire tourner et incliner une table pourvue d'un alésage central, sur laquelle est montée une bride de positionnement de ligne médiane de jante de roue de hauteur variable pour réaliser le contrôle et le centrage des rayons de la roue. 5
2. Dispositif selon la revendication 1, **caractérisé en ce que** la table est supportée par le banc à travers un pivot rotatif ce qui permet à la table de tourner et de la verrouiller dans la position désirée. 10
3. Dispositif selon la revendication 2, **caractérisé en ce que** les deux côtés de la table servent de partie avant de même que de référence pour la configuration des divers types de roues, les rayons étant aménagés selon une configuration différente. 15
4. Dispositif selon la revendication 1, **caractérisé en ce que** la table est en forme d'étoile avec des parties saillantes, afin de bloquer les roues avec les rayons fixés sur la bague externe de la jante. 20
5. Dispositif selon l'une des revendications précédentes, **caractérisé en ce que** le contrôle fait appel à un système de tiges de contrôle et de voyants témoins fixés de manière réglable à un bras rotatif relié au pivot du moyeu de verrouillage de la roue à la table. 25
6. Dispositif selon l'une des revendications précédentes, **caractérisé en ce qu'il** fournit des garnissages de hauteur variable pour déplacer la ligne médiane du moyeu sur la face. 30
7. Dispositif selon l'une des revendications précédentes, **caractérisé en ce que** la configuration du centrage des rayons consiste à régler leur longueur et à serrer les tiges de tension respectives, selon le plan de référence. 35



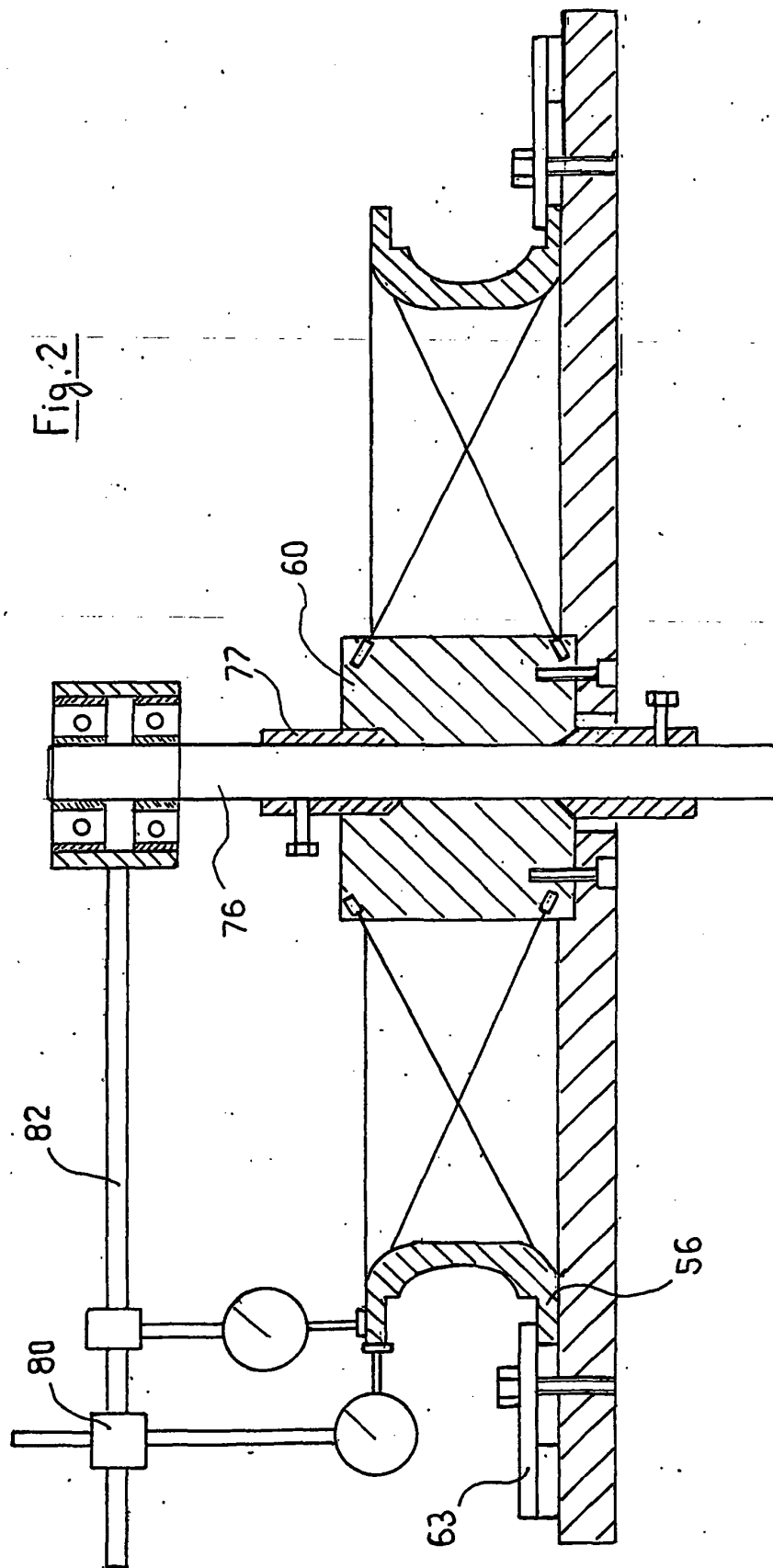


Fig. 3

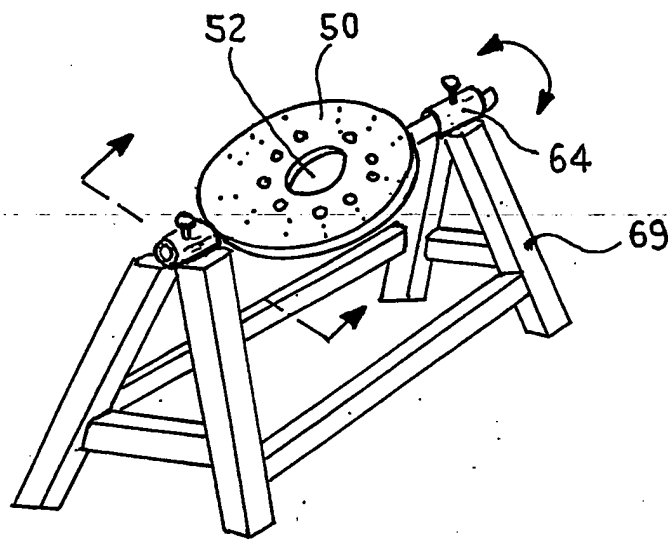
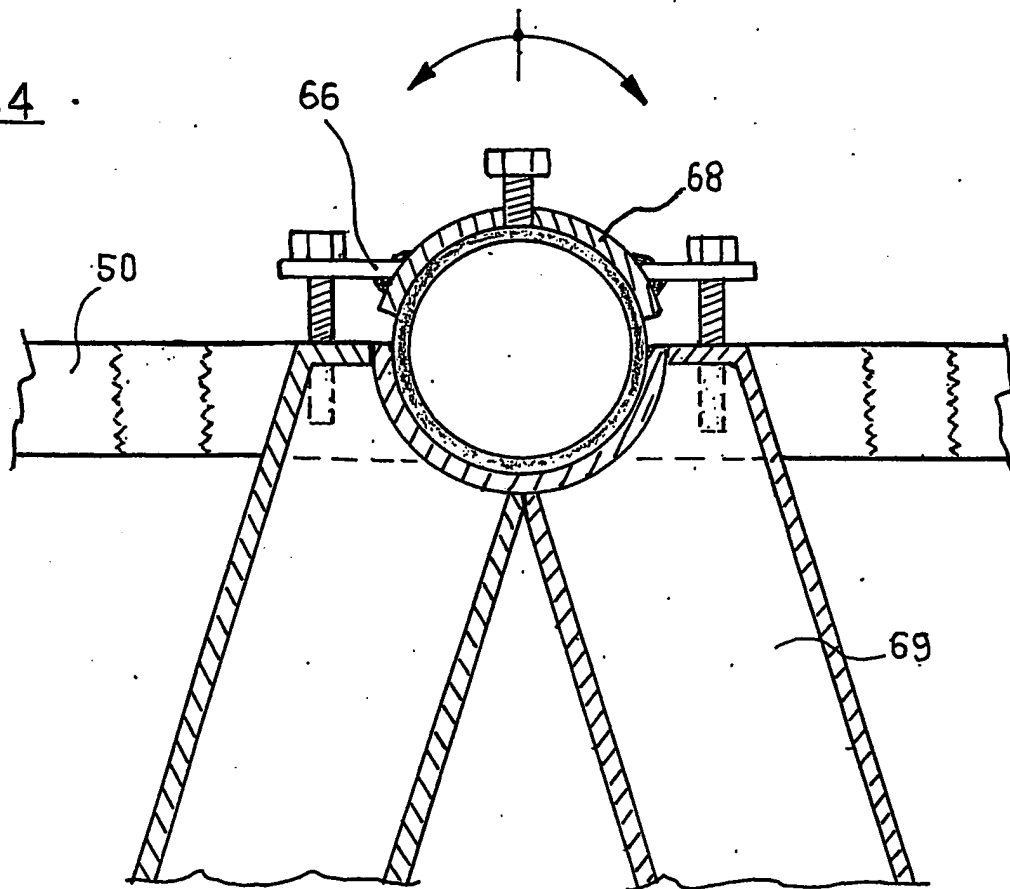


Fig. 4



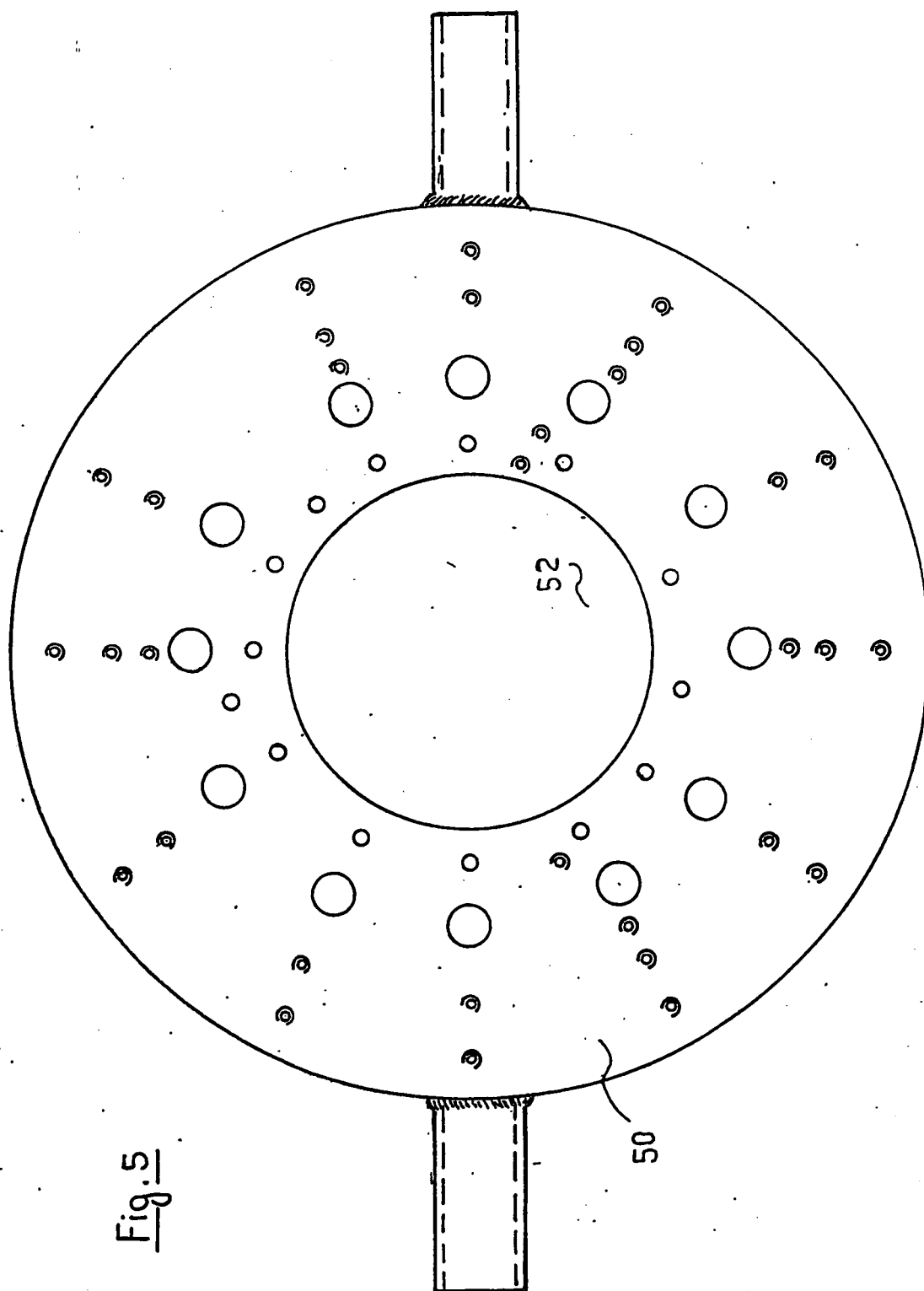


Fig. 6

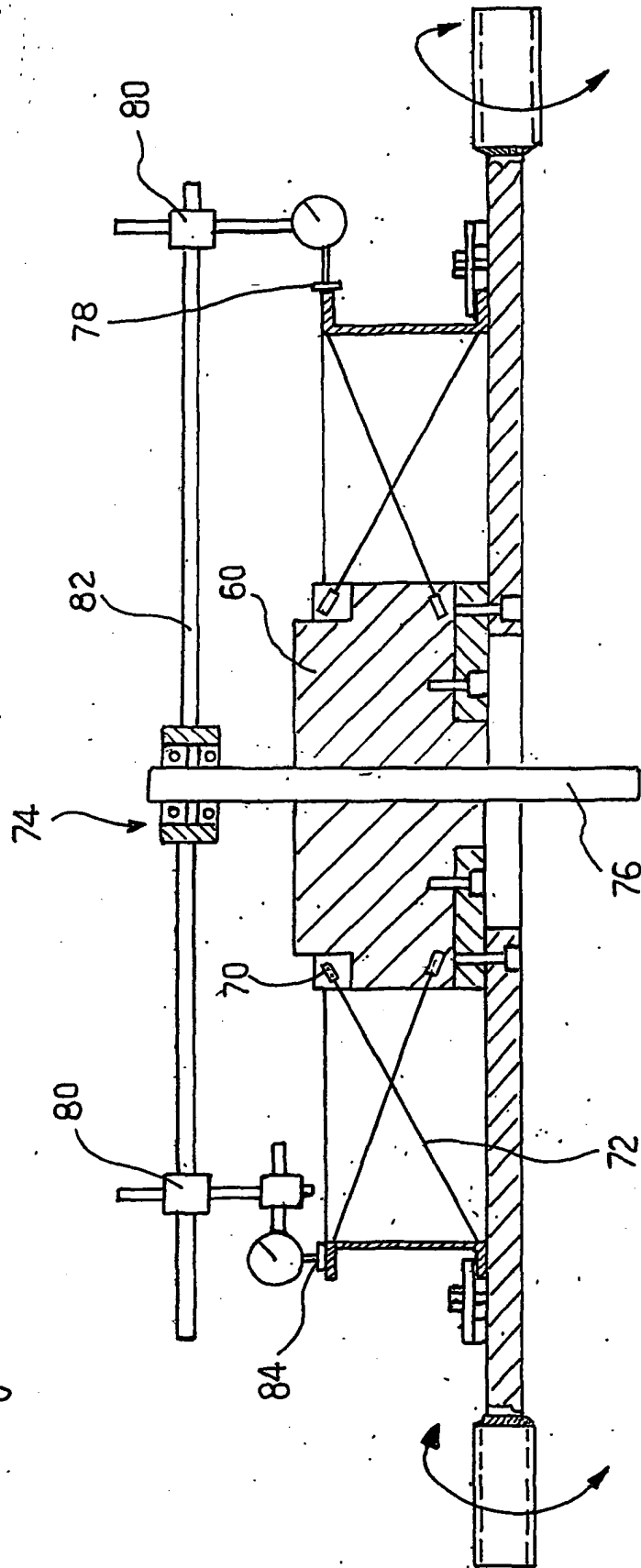


Fig. 7

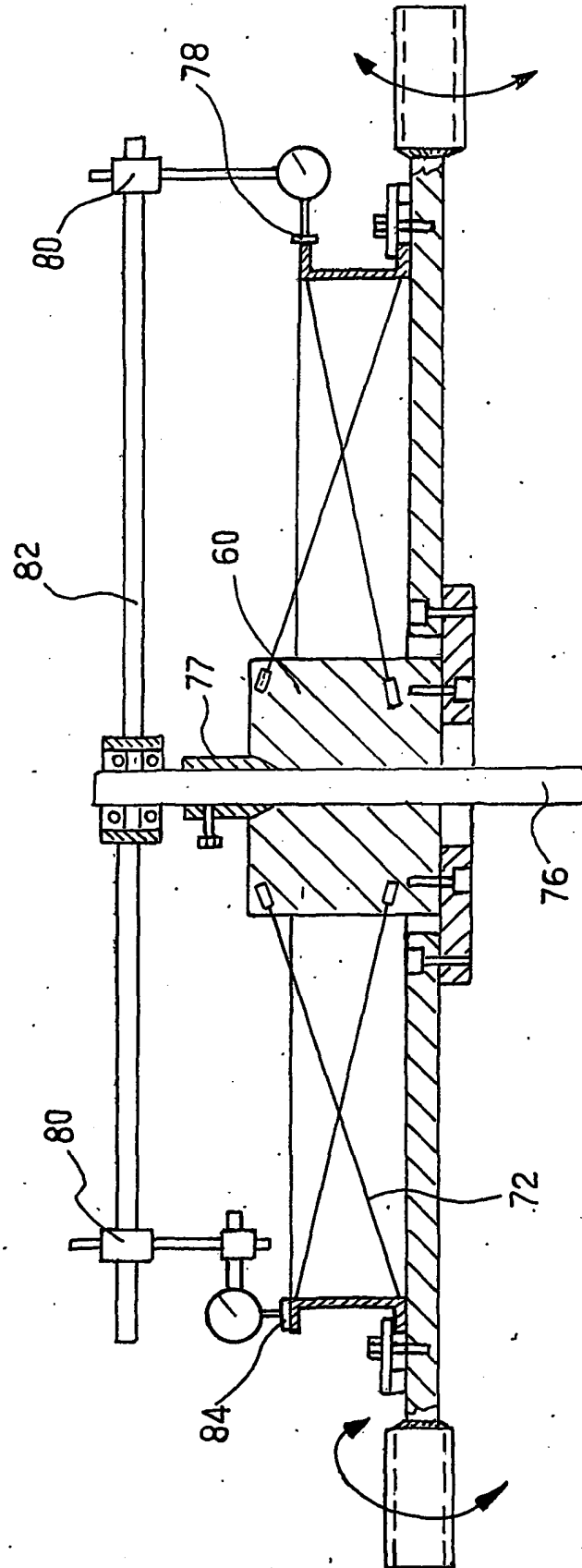
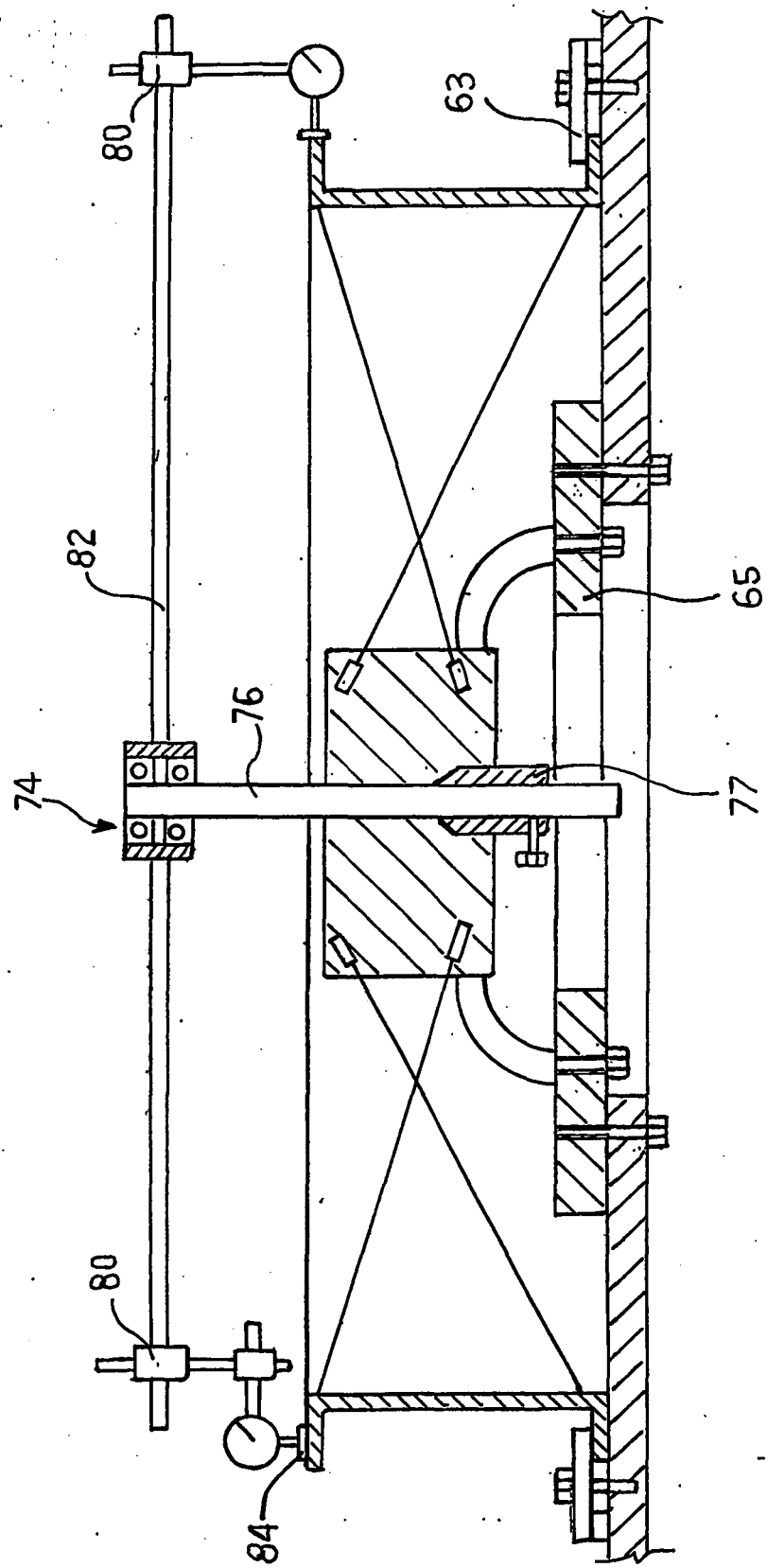
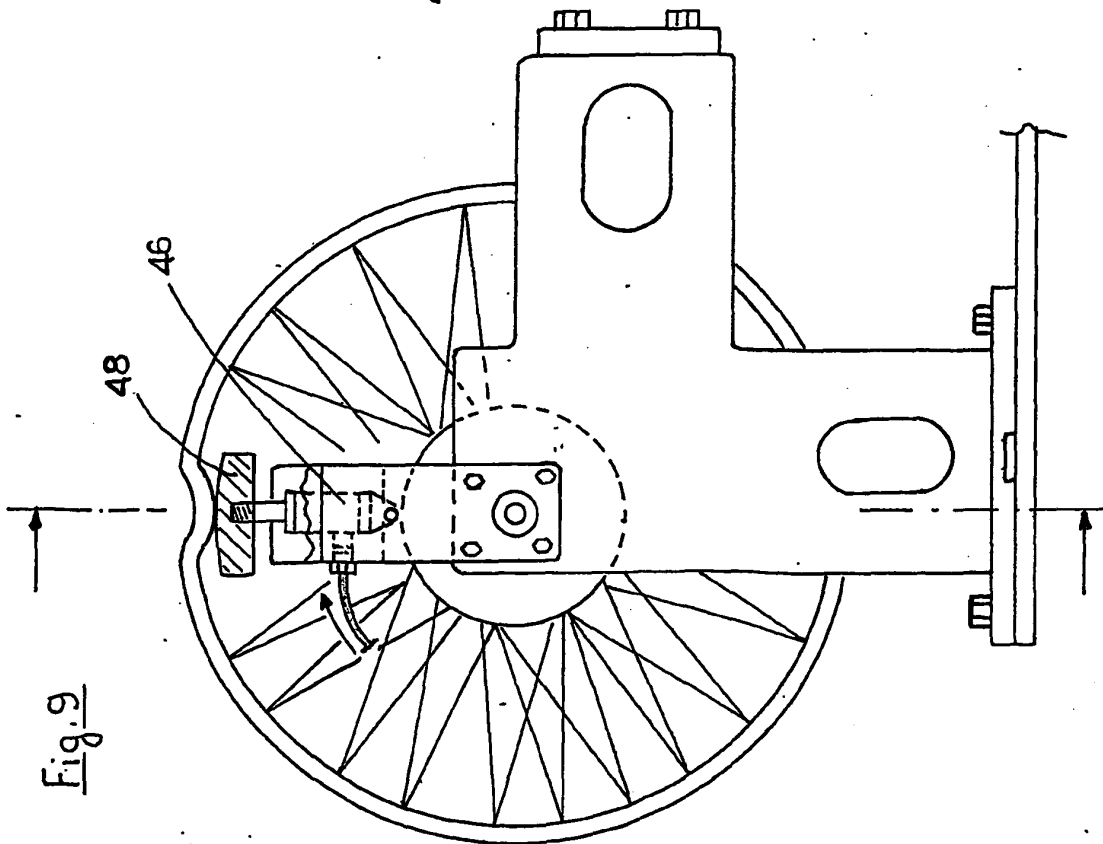
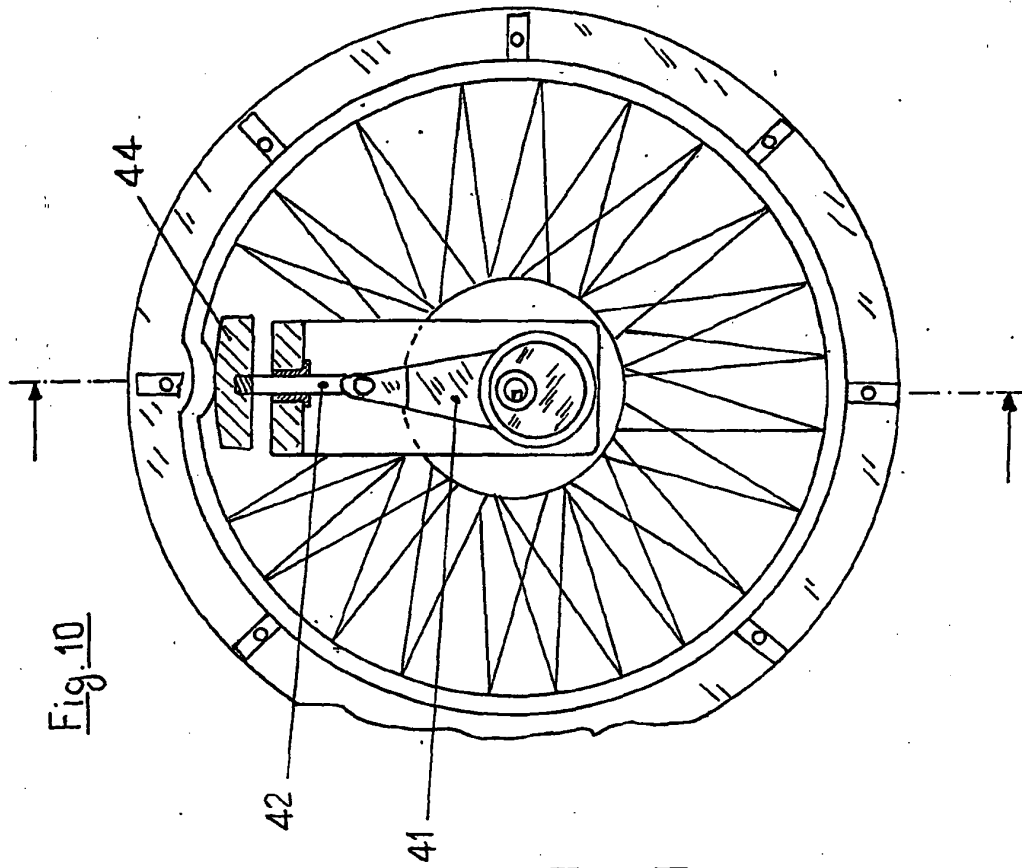


Fig. 8





REFERENCES CITED IN THE DESCRIPTION

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