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(54) Bicycle for exercise, particulary a spinning bicycle

(57) There is described an exercise bicycle, particularly spinning bicycle, including a bicycle frame, height adjustable handlebars, a height adjustable saddle, a flywheel, a crank bearing housing (2) which is connected to the bicycle frame and having a throughgoing crankshaft (30) which at one end is adapted for direct no-turn connection with a base part of a crank, and which at the opposite end is designed with a drive pulley (34) and a base part for a second crank, the drive pulley (34) being connected with a drive pulley on a hub section of the flywheel by means of a drive belt, where the crankshaft (30) within the drive pulley (34) is rotationally rigidly connected with a brake disk (42) surrounded by a brake chamber (2) with braking cylinders (46,48) in which braking pistons (50,52) are movably suspended in such a way that the brake pistons (50,52), by supplying brake liquid at their respective rear sides, are adapted to exert a braking pressure at opposite sides of the brake disk (42), preferably via brake shoes (54,56) with a brake lining (58,60). By means of simple measures is hereby achieved an improved exercise bicycle, in particular a spinning bicycle, that may be produced with optimal strength.

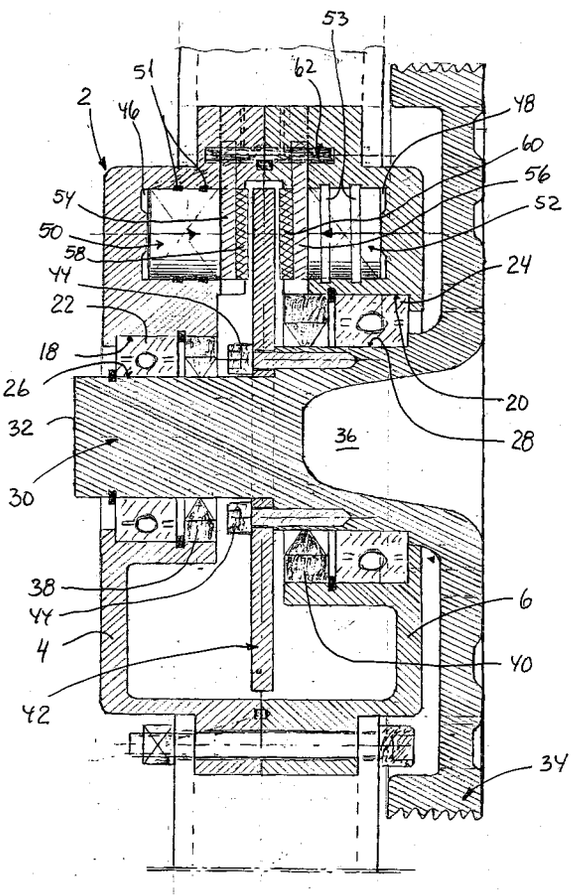

Fig. 1

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Description

Field of the Invention

[0001] The present invention concerns an exercise bicycle, particularly a spinning bicycle, and of the kind specified in preamble of claim 1.

Background of the Invention

[0002] Usually, the crank on bicycles is constructed based on compromise, as the bicycle crank is to fulfil certain criteria with regard to strength, durability and ability to transmit maximum forces, including torque from pedals to transmission, and is not to constitute too great weight load of the bicycle construction as a whole. Such a compromise almost always means in practice that the bicycle crank is having a very delicate construction that easily becomes the "Achilles' heel" of the bicycle.

[0003] In connection with stationary exercise bicycles where the mechanical loads on pedal and crank system may be extremely large, which particularly is the case with so-called spinning, where the exercise is to bring a flywheel into very great speed and concurrently following with it, as during spinning there is constant drive connection between pedals and flywheel. Consequently, there are quite extraordinary requirements to the strength of the bicycle crank by e.g. a spinning bicycle if the producer is to provide the usual time guarantee.

[0004] Exercise bicycles for use with spinning exercises are furthermore, in connection with the flywheel, provided with a braking system that primarily serves to vary the hardness of the treading, i.e. one may brake the flywheel in order to increase the load for the user. The brake system may also be used at the end of the spinning exercise for entirely braking the flywheel.

[0005] Known braking systems for this purpose normally includes a turning handle so that by turning the handle clockwise, one may increase the braking pressure successively in that a brake show, e.g. of leather, is pressed against the periphery of the flywheel. If one desires to reduce the braking pressure, the handle is just turned counterclockwise.

[0006] Frequently, the turning handle may furthermore be pressed downwards for more directly exerting a brake pressure on the periphery of the flywheel with the intention of entirely braking and stopping the rotation of the flywheel, e.g. at the end of the spinning exercise.

[0007] During spinning exercises, which are very strenuous, the executant is frequently sweating so much that large amounts of perspiration drips down on the exercise bicycle precisely in the area where the braking system is disposed, which can have an adverse effect on the braking system i.a. due to perspiration being saline.

Object of the Invention

[0008] The invention has the purpose of indicating an improved exercise bicycle, particularly a spinning bicycle crank which by means of simple measures enables counteracting the above drawbacks.

Short Description of the Invention

[0009] The exercise bicycle according to the invention is characterised in that the crankshaft within the drive pulley is rotationally rigidly connected with a brake disk surrounded by a brake chamber with braking cylinders in which braking pistons are movably suspended in such a way that the brake pistons, by supplying brake liquid at their respective rear sides, are adapted to exert a braking pressure at opposite sides of the brake disk, preferably via brake shoes with a brake lining. By means of simple measures is hereby achieved an improved exercise bicycle that may be produced with optimal strength, and where the above mentioned drawbacks are counteracted.

[0010] Suitably, the exercise bicycle according the invention is designed so that the brake chamber consists of two chamber parts having mutually interacting peripheral joint faces, and which furthermore constitute said crank bearing housing, which brake cylinders are designed opposite each other in the said chamber parts.

[0011] According to the invention, the exercise bicycle is further designed so that the said brake chamber is filled with liquid for cooling the brake disk, the cooling liquid e.g. constituted by about 750 ml special hydraulic liquid.

[0012] With the purpose of optimising the production, the chamber parts of the brake chamber are designed as bodies of revolution that both at one side, preferably opposite the brake disk, are designed with the mutually interacting peripheral joint faces, and which at opposite sides are designed with bearing liners for fixing outer rings of ball bearings, the inner rings of which being fixed to the bearing liners of the crankshaft.

[0013] The exercise bicycle according to the invention is furthermore in a suitable way designed so that the brake chamber is sealed at the interacting peripheral joint face by means of annular grooves and a O-ring packing and by means of stuffing boxes that are mounted on the bearing liners within respective ball bearings.

[0014] With the purpose of simplifying the production of the exercise bicycle according to the invention, this is preferably designed so that the said crank bearing housing consisting of two chamber parts of the brake chamber is adapted to be prefabricated as a ready-to-use unit with crankshaft, brake disk, brake pistons with associated brake shoes and liner which subsequently is just to be inserted in a semicircular cutout in the cycle frame and clamped by means of few bolts before mounting cranks at opposite side of the crankshaft and connecting brake hose.

[0015] The exercise bicycle according to the invention is further designed so that the said brake pistons are arranged to be activated by supplying brake liquid under pressure at the rear sides of the brake pistons for preferably simultaneously pressing the brake shoes and the brake liner, respectively, against opposite sides of the brake disk by means of an external brake cylinder with an actuation piston which is connected with a turning handle known per se and arranged for by turning, e.g. clockwise, to perform actuation of the actuation piston, and conversely, by turning the handle in the opposite direction, which actuation piston also being arranged for actuating the brake pistons more directly by pressing down the handle with the purpose of entirely braking the brake disk and the flywheel, e.g. by finishing a spinning exercise.

[0016] The exercise bicycle according to the invention is furthermore designed so that the flywheel consists of a solid steel plate with a weight of about 12 kg, a thickness of about 6 mm and a diameter of about 530 mm, and that the gearing between respective drive pulleys is about 1:4,7.

[0017] Alternatively, the exercise bicycle according to the invention may be designed so that the crankshaft is rotationally rigidly connected with braking means of a braking system that includes a combined braking chamber and crank bearing housing which as a prefabricated unit is arranged for insertion into and clamping in a cutout in the frame in such a way that the braking chamber is placed within the frame. This implies that the braking system in practice can be constituted by any suitable braking system, e.g. an electromagnetic braking system, a hydraulic braking system or a pneumatic braking system.

[0018] Preferably, the exercise bicycle according to the invention is designed so that the said braking system is constituted by an electric rotating machine including a rotor which is connected with the said crankshaft and which constitutes the brake means, and a stator including an electromagnetic system for generating a magnet field for braking the said rotor.

Short Description of the Drawing

[0019] The invention is explained in the following in connection with the drawing on which:

Fig. 1 shows a view, partly in section, of an embodiment of a combined brake chamber and crank bearing housing mounted with crankshaft and brake pistons and shown mounted in a frame of an exercise bicycle according to the invention;

Fig. 2 shows a view of a combined brake chamber and crank bearing housing, cf. Fig. 1 during mounting in a frame of an exercise bicycle according to the invention;

Fig. 3 shows a view of the combined braking chamber and crank bearing housing shown in Fig. 2, where a brake hose is about to be mounted;

Fig. 4 shows a view of the combined braking chamber and crank bearing housing shown in Fig. 2 as seen from the side opposite the drive pulley;

Fig. 5 shows a view of a frame part (handlebar tube) with built-in actuating cylinder with liquid reservoir for braking system activated with usual turning handle;

Fig. 6 shows a view of a detail by an embodiment for a drive pulley on the exercise bicycle according to the invention;

Fig. 7 shows a view of a prototype of an exercise bicycle according to the invention;

Fig. 8 shows another view of the prototype shown in Fig. 7 for an exercise bicycle according to the invention, where the frame has not yet been formed with a milling for receiving the combined braking chamber and crank bearing housing;

Fig. 9 shows a view of an embodiment of a crankshaft with integrated drive pulley;

Fig. 10 shows another view of the crankshaft shown in Fig. 9, seen from the opposite side, i.e. the side where the combined brake chamber and crank bearing housing is to be mounted on the crankshaft;

Fig. 11 shows a view of an embodiment of a chamber section for a combined brake chamber and crank bearing housing for an exercise bicycle according to the invention;

Fig. 12 shows a view of a brake disk for fastening on a crankshaft on a bicycle according to the invention; and

Fig. 13 shows a view of an embodiment of a brake piston for an exercise bicycle according to the invention.

Detailed Description of the Invention

[0020] The combined brake chamber and crank bearing housing 2 shown in Fig. 1 consists of two chamber parts 4 and 6 that both, cf. Fig. 11, are mainly shaped as bodies of revolution and which inwards are having mutually interacting joint faces 8, 10 with annular grooves 12, 14 in which are embedded an O-ring sealing 16, so that the brake chamber 2, by clamping the chamber parts 4 and 6 together, is sealed to the outside. The chamber parts 4 and 6 are designed with bearing liners 18 and 20 for outer rings of ball bearings 22 and 24, of which inner rings are connected with bearing liners 26 and 28 which are designed on a through-going crankshaft 30 which at an end part 32 is arranged for being connected with a base part of a crank, and which at an opposite end part is designed with a drive belt pulley 34 that partially encloses the chamber part 6 of the com-

bined brake chamber and crank bearing housing 2. Outside a central hollow 36 of the drive pulley 34, this is also adapted for being connected with a laminar base part of crank.

[0021] Inwards, the brake chamber 2 is furthermore sealed by means of stuffing boxes 38 and 40 that are mounted within the ball bearings 22 and 24 between respective bearing liners 18,26 and 20, 28 of the chamber parts 4, 6 and the crankshaft 30, respectively. The ball bearing 22 is furthermore fixed to the chamber part 4 and to the crankshaft 32 by means of lock rings as well as the ball bearing 24 is fixed to the chamber part 6 by means of a lock ring.

[0022] Centrally in the brake chamber 2 is a brake disk 42 secured to an internal shoulder of the crankshaft 30 by means of bolts 44. At a side of the chamber part 4 and 6, these are opposite to each other designed with brake cylinders 46 and 48 in which are embedded brake pistons 50 and 52 with associated piston rings 51 and 53. The brake pistons 50 and 52 are simultaneously supplied brake liquid under pressure in a known way at their rear sides and are displaced inwards against brake shoes 54 and 56 with brake linings 58 and 60, so that the brake disk 42 can be effectively braked. The brake shoes 54 and 56 preferably consist of rectangular steel plates that are disposed in rectangular, radial cutouts 57 in respective joint faces 8, 10 of the chamber parts (Fig. 11), and which outermost in the radial cutouts are fixed by means of a common lock pin 62.

[0023] As most clearly seen in Figs. 2 and 4, it is a very important aspect of the invention that the complete, combined brake chamber and crank bearing housing 2 can be inserted as a prefabricated unit and secured in a semicircular cutout in the frame in such a way that external flange parts of the brake chamber 2 (Fig. 1) are disposed internally in the frame. In order to secure the assembled brake chamber 2 in the frame, it is necessary that - as most clearly shown in Fig. 6 - a mounting hole is formed in the drive pulley 34 so that access is provided to the respective securing bolts. When the crank is subsequently to be secured at the side of the drive pulley 34, the crank is disposed in such direction as to cover the said mounting hole in the drive pulley, after which the crank at the opposite end of the crankshaft is mounted 180° displaced in relation to the first crank.

[0024] Finally, it is to be pointed out that the exercise bicycle is designed so that the crankshaft is rotationally rigidly connected with a suitable braking system which, with the intention of simplifying and making cheap the mounting, is incorporated in the combined brake chamber and crank bearing housing. This implies that the braking system by the exercise bicycle according to the invention in practice can be constituted by any suitable braking system, e.g. an electromagnetic braking system, a hydraulic braking system or a pneumatic braking system.

Claims

1. Exercise bicycle, particularly spinning bicycle, including a bicycle frame, height adjustable handlebars, a height adjustable saddle, a flywheel, a crank bearing housing which is connected to the bicycle frame and having a through-going crankshaft which at one end is adapted for direct no-turn connection with a base part of a crank, and which at the opposite end is designed with a drive pulley and a base part for a second crank, the drive pulley being connected with a drive pulley on a hub section of the flywheel by means of a drive belt, **characterised in that** the crankshaft within the drive pulley is rotationally rigidly connected with a brake disk surrounded by a brake chamber with braking cylinders in which braking pistons are movably suspended in such a way that the brake pistons, by supplying brake liquid at their respective rear sides, are adapted to exert a braking pressure at opposite sides of the brake disc, preferably via brake shoes with a brake lining.

2. Exercise bicycle according to claim 1, **characterised in that** the brake chamber consists of two chamber parts having mutually interacting peripheral joint faces, and which furthermore constitute said crank bearing housing, which brake cylinders are designed opposite each other in the said chamber parts.

3. Exercise bicycle according to claim 1, **characterised in that** the said brake chamber is filled with liquid for cooling the brake disk, the cooling liquid e.g. constituted by about 750 ml special hydraulic liquid.

4. Exercise bicycle according to claim 1, **characterised in that** the chamber parts of the brake chamber are designed as bodies of revolution that both at one side, preferably opposite the brake disk, are designed with the mutually interacting peripheral joint faces, and which at opposite sides are designed with bearing liners for fixing outer rings of ball bearings, the inner rings of which being fixed to the bearing liners of the crankshaft.

5. Exercise bicycle according to any of claims 1 - 4, **characterised in that** the brake chamber is sealed at the interacting peripheral joint face by means of annular grooves and a O-ring packing and by means of stuffing boxes that are mounted on the bearing liners within respective ball bearings.

6. Exercise bicycle according to any of claims 1 - 5, **characterised in that** the said crank bearing housing consisting of two chamber parts of the brake chamber is adapted to be prefabricated as a ready-

to-use unit with crankshaft, brake disk, brake pistons with associated brake shoes and liner which subsequently is just to be inserted in a semicircular cutout in the cycle frame and clamped by means of few bolts before mounting cranks at opposite side of the crankshaft and connecting brake hose.

7. Exercise bicycle according to any of claims 1 - 6, **characterised in that** the said brake pistons are arranged to be activated by supplying brake liquid under pressure at the rear sides of the brake pistons for preferably simultaneously pressing the brake shoes and the brake liner, respectively, against opposite sides of the brake disk by means of an external brake cylinder with an actuation piston which is connected with a turning handle known per se and arranged for by turning, e.g. clockwise, to perform actuation of the actuation piston, and conversely, by turning the handle in the opposite direction, which actuation piston also being arranged for actuating the brake pistons more directly by pressing down the handle with the purpose of entirely braking the brake disk and the flywheel, e.g. by finishing a spinning exercise.

8. Exercise bicycle according to claim 1, **characterised in that** the flywheel consists of a solid steel plate with a weight of about 12 kg, a thickness of about 6 mm and a diameter of about 530 mm, and that the gearing between respective drive pulleys is about 1:4,7.

9. Exercise bicycle according to claim 1, **characterised in that** the crankshaft is rotationally rigidly connected with braking means of a braking system that includes a combined braking chamber and crank bearing housing which as a prefabricated unit is arranged for insertion into and clamping in a cutout in the frame in such a way that the braking chamber is placed within the frame.

10. Exercise bicycle according to claim 9, **characterised in that** the said braking system is constituted by an electric rotating machine including a rotor which is connected with the said crankshaft and which constitutes the brake means, and a stator including an electromagnetic system for generating a magnet field for braking the said rotor.

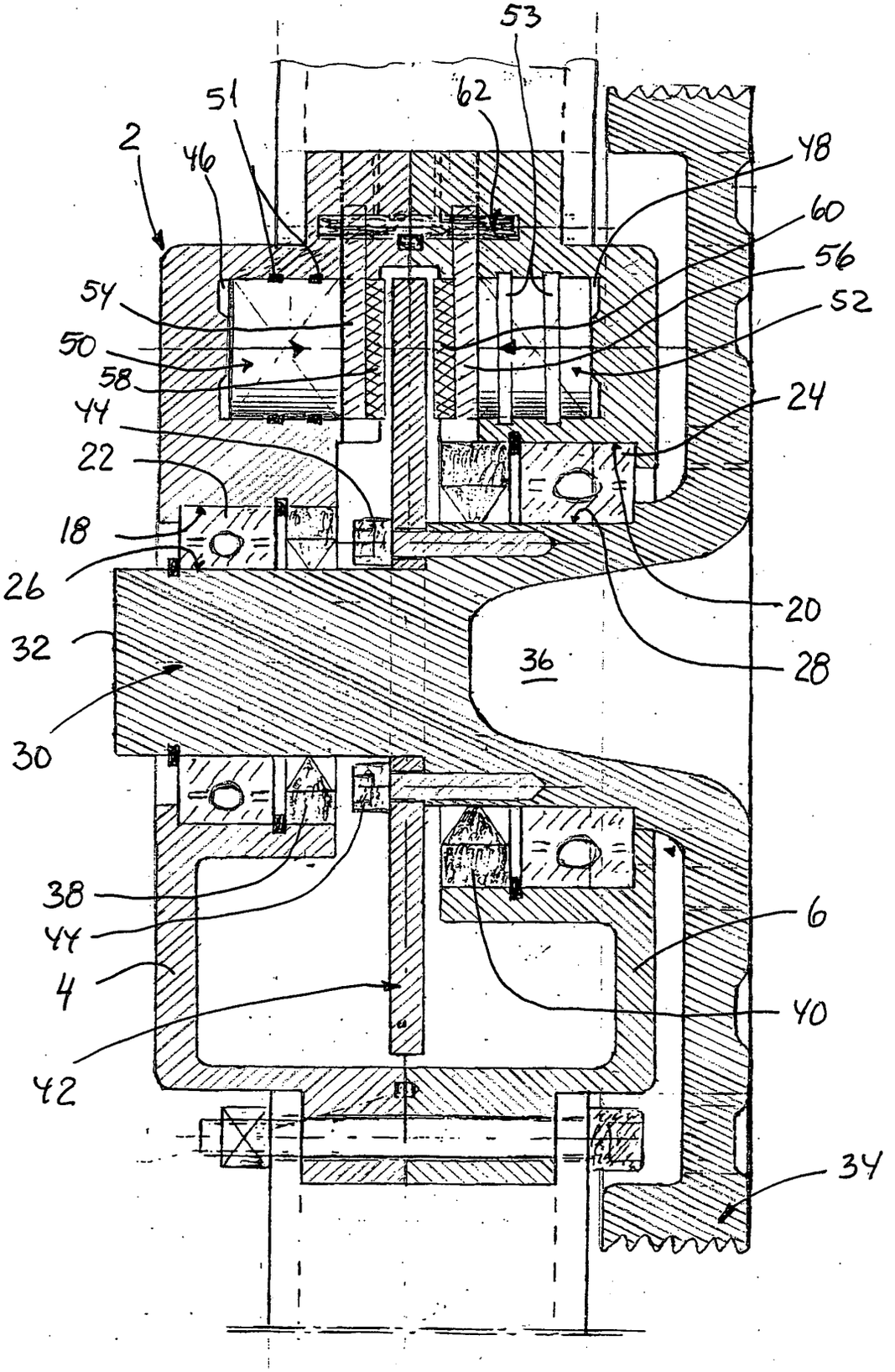
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Fig. 1

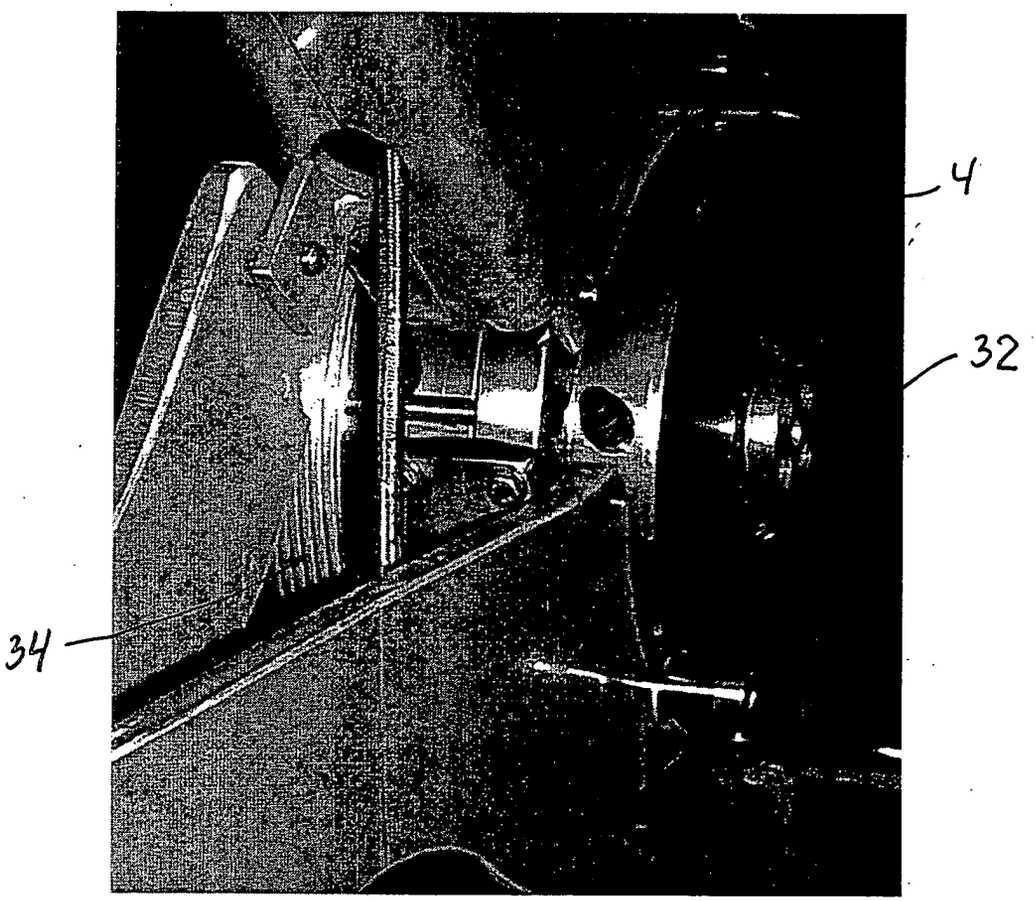

Fig. 2

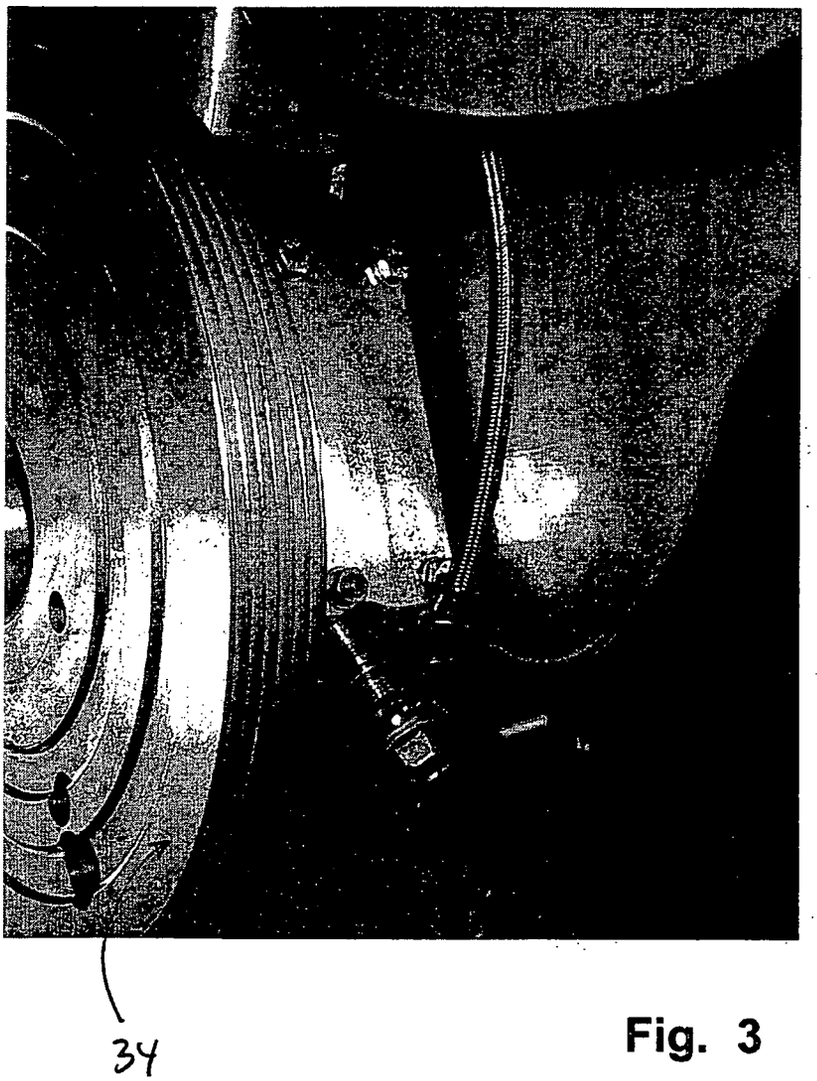

Fig. 3

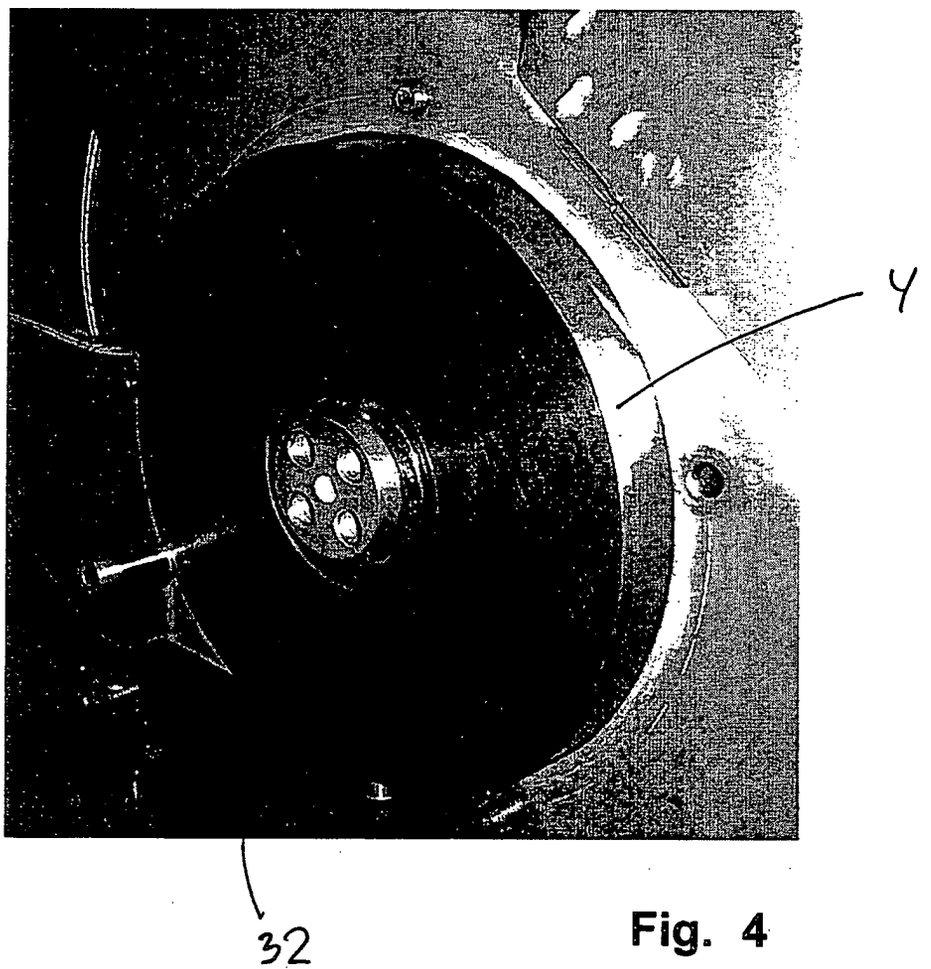

Fig. 4

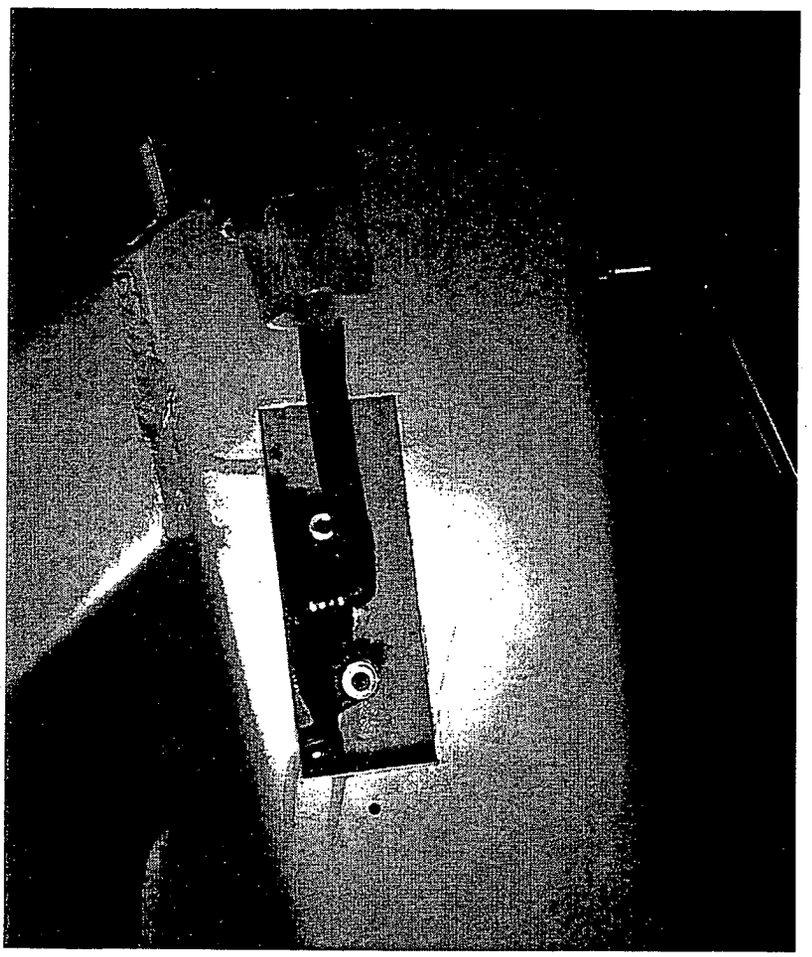

Fig. 5

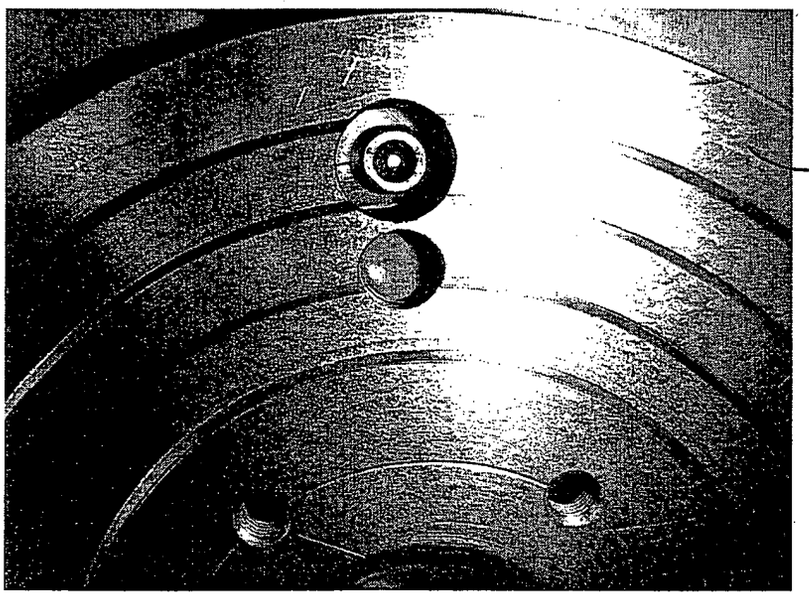

Fig. 6

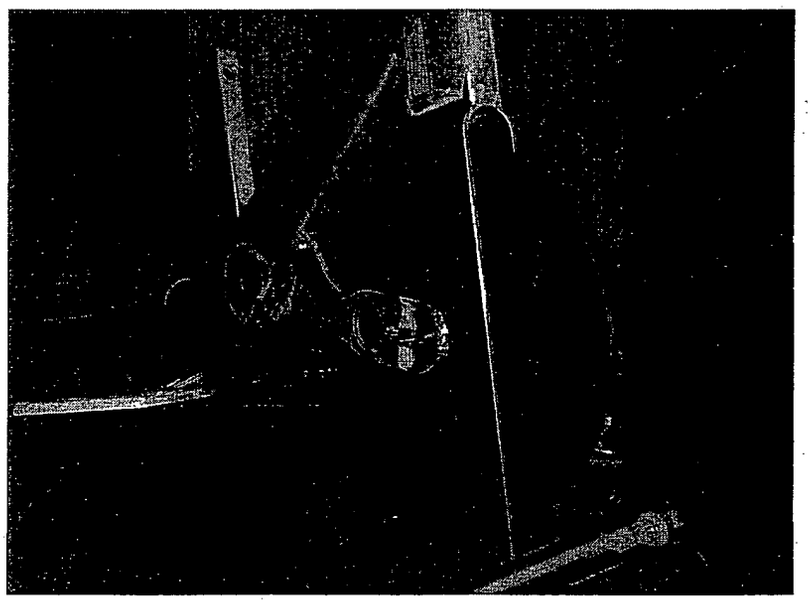

Fig. 7

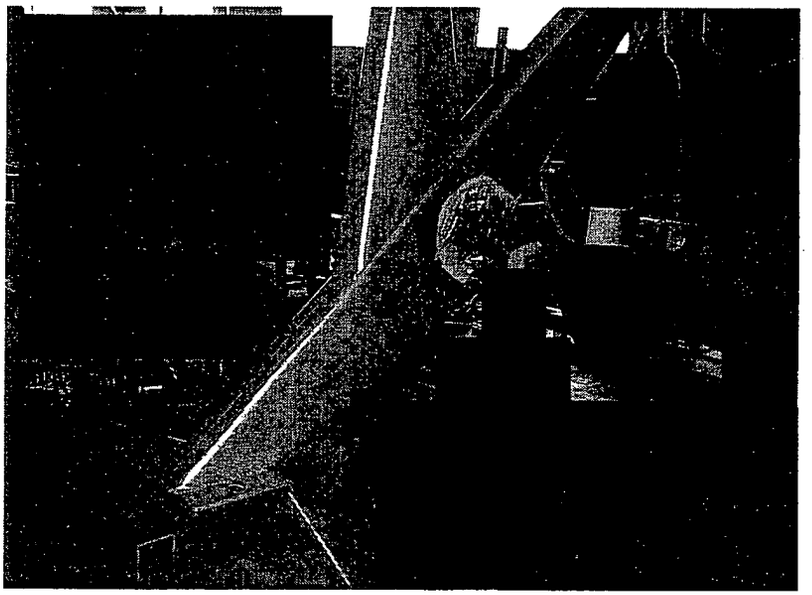

Fig. 8

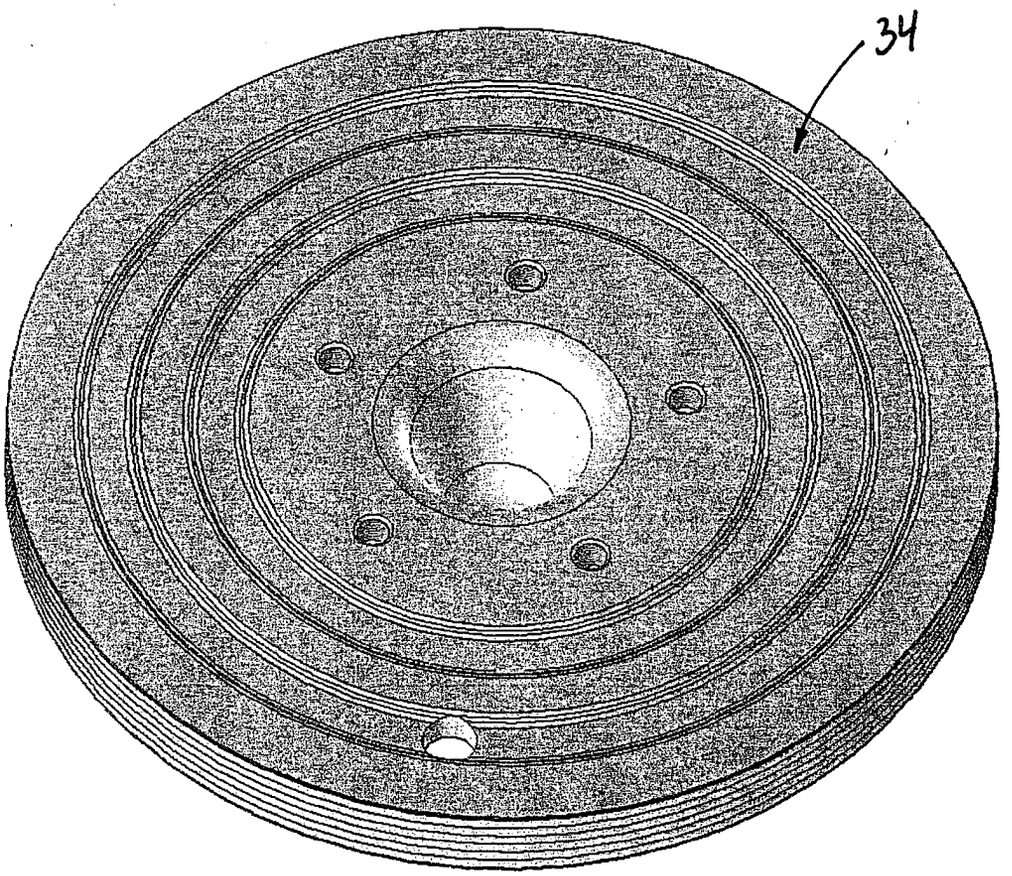

Fig. 9

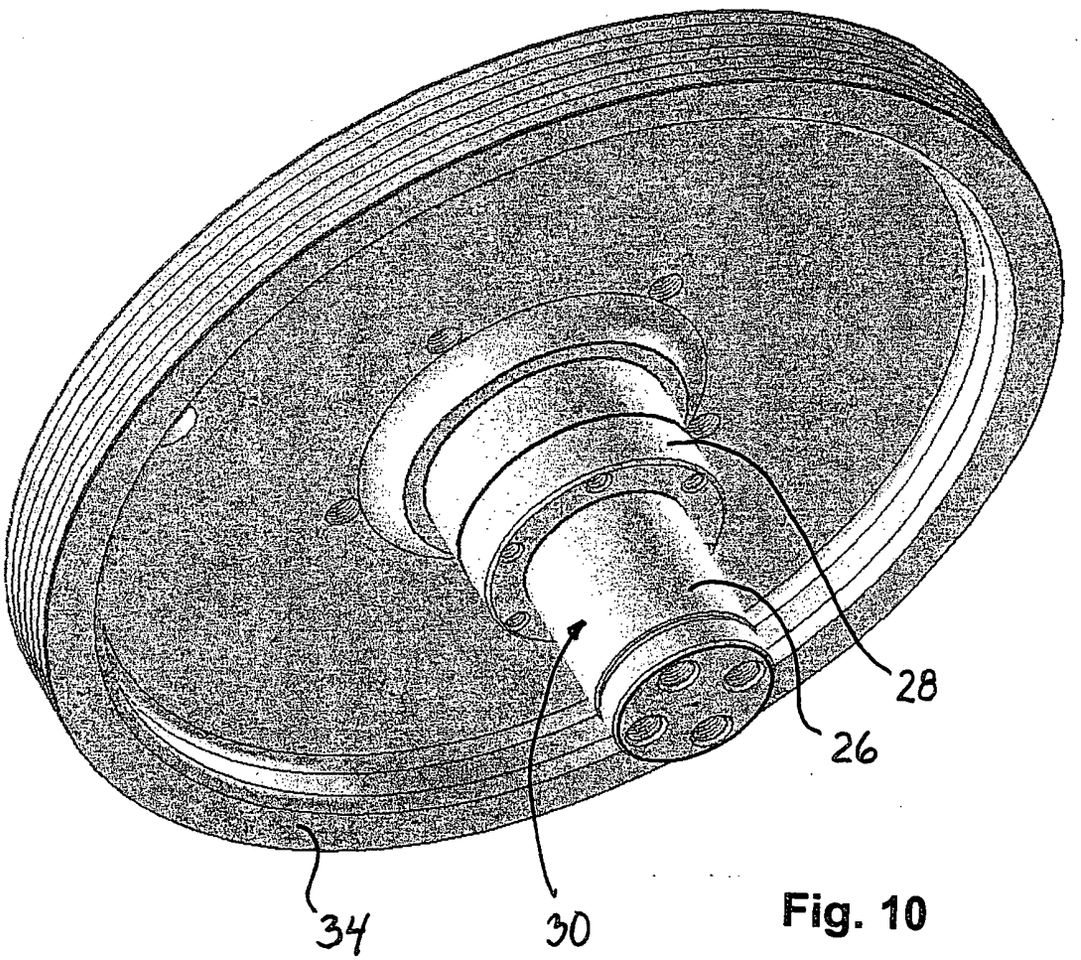

Fig. 10

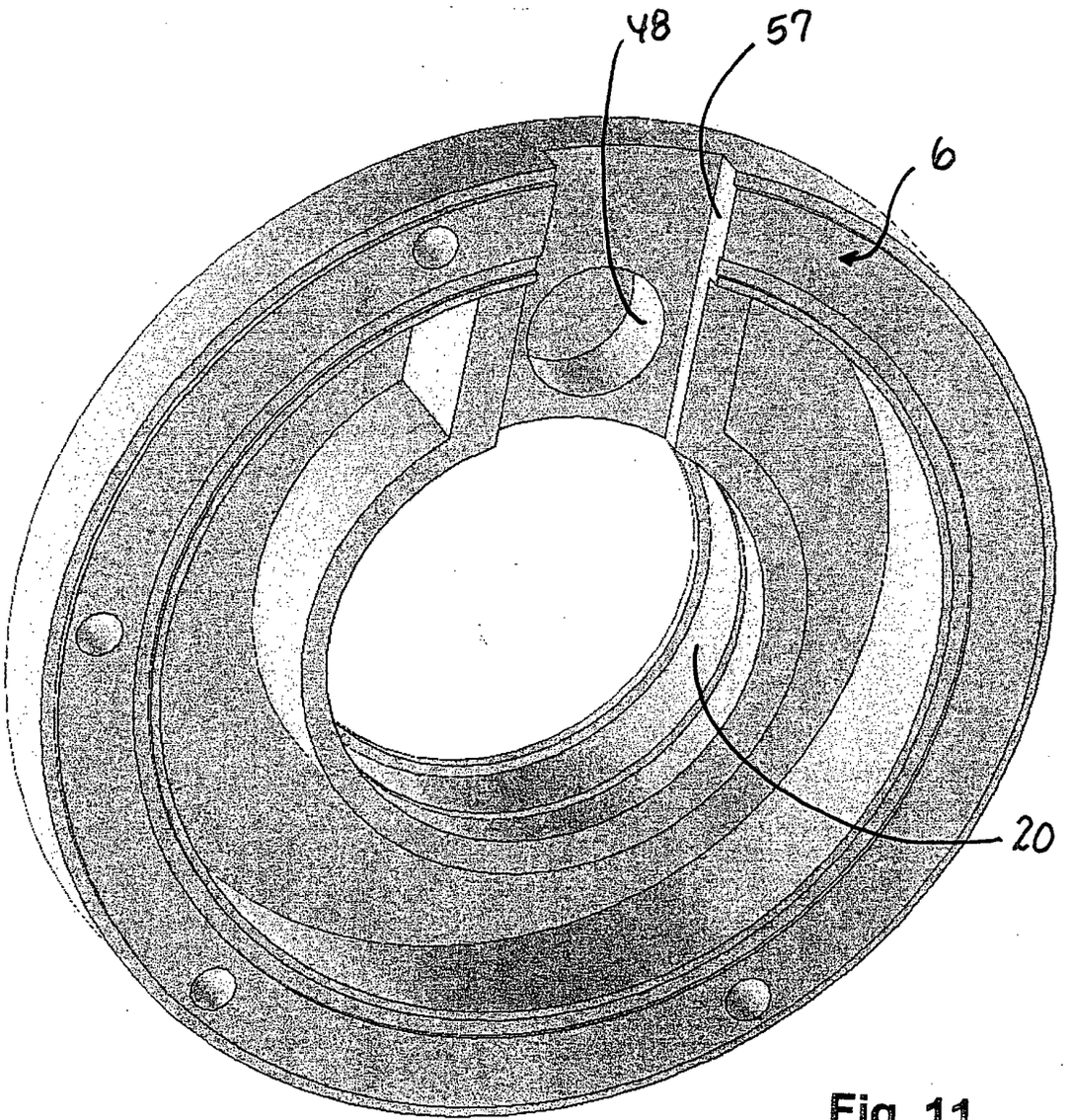

Fig. 11

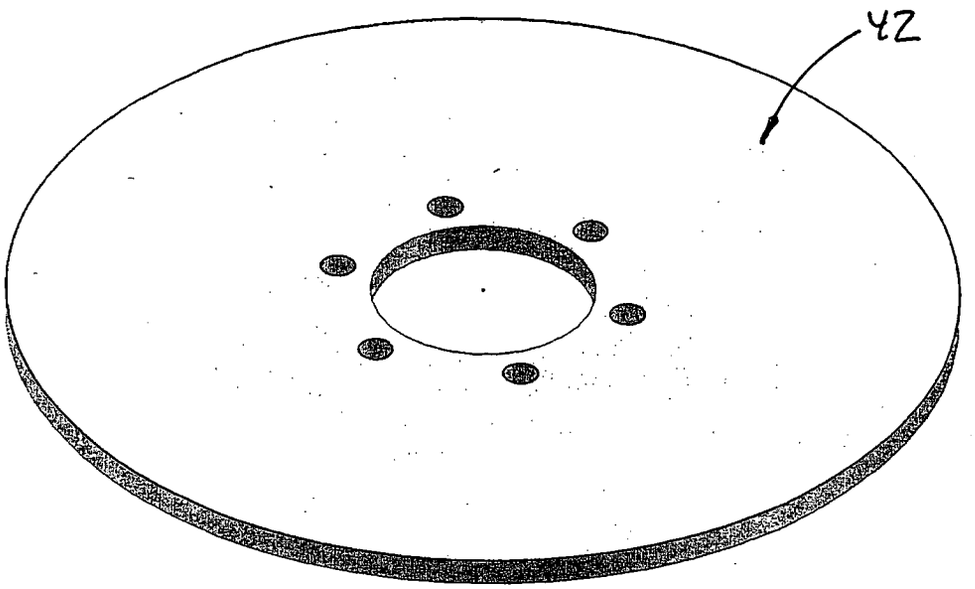

Fig. 12

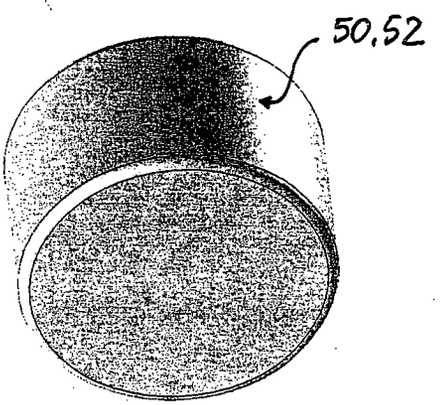

Fig. 13