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(54) A reclining chair having a footrest and clamping device

(57) An improved reclinable chair which includes a seat portion pivotably attached to a back portion and a footrest pivotably attached to the front of the seat portion. The relative angle between the foot rest and the seat portion remains constant for varying angles of inclination of the chair.

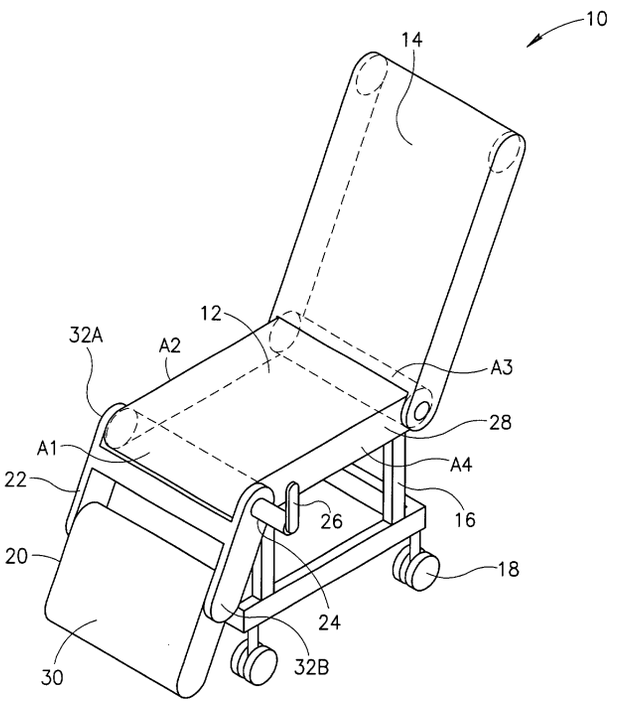

FIG.1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to reclining chairs in general and to a reclinable orthopedic chair coupled with an adaptable footrest and lockable clamping device.

BACKGROUND OF THE INVENTION

[0002] Reclining orthopedic chairs and beds are known in the art as are such chairs and beds having footrests attached thereto. These chairs generally include tilting or bending portions, which can be angularly adjusted to provide varying positions allowing a person to sit and/or recline comfortably.

[0003] Foot rests are generally added to such reclining chairs to provide support for the user while seated or reclining in order to increase the level of user comfort.

[0004] One of the disadvantages of such chairs is the difficulty of adjusting the angle of the footrest so that the position of the footrest relative to the seat is maintained at a comfortable level.

SUMMARY OF THE INVENTION

[0005] The present invention provides an improved reclining chair having a footrest pivotally attached thereto, which overcome the disadvantages of prior art reclining chairs. The angle of the footrest is adjustable and remains at a constant angle relative to the seat of the chair.

[0006] A further object of the present invention is to provide a lockable clamping system, which is useful for many devices including the reclining chair of the invention.

[0007] There is thus provided, in accordance with a preferred embodiment of the present invention, a reclinable chair which includes a seat portion pivotably attached to a back portion and a footrest pivotably attached to the front of the seat portion. The relative angle between the foot rest and the seat portion remains constant for varying angles of inclination of the chair.

[0008] Furthermore, in accordance with a preferred embodiment of the present invention, the chair further includes an operating device pivotally attached to the seat frame of the seat portion and fitted to the footrest, for altering the angle of inclination of the footrest.

[0009] In addition, in accordance with a preferred embodiment of the present invention, the chair further includes a lockable clamping device fitted to the footrest for locking and releasing the footrest, the lockable clamping device being in communication with a handling device.

[0010] Furthermore, in accordance with a preferred embodiment of the present invention, the operating device includes a substantially rectangular structure having a pair of connecting elements coupled to a pair of shaft-like elements; a pair of toothed cogs, each of which is connected to one end of the pair of shaft-like elements; and a connecting device operatively coupled to the toothed cogs thereby to integrally link the movement of the pair of shaft-like elements.

[0011] Furthermore, in accordance with a preferred embodiment of the present invention, the connecting device includes one of a group including a toothed chain, a strap, a belt, a band and a cable.

[0012] In addition, in accordance with a preferred embodiment of the present invention, the lockable clamping device includes at least two disc-like elements separated by a rotatable stopper, the at least two disc-like elements in communication with the shaft-like elements and the rotatable stopper in communication with the handling device; and a clutch device includes a plurality of springs in communication with the shaft-like elements. Each of the disc-like elements have an asymmetrical slot formed therein to allow the rotatable stopper limited movement.

[0013] Furthermore, in accordance with a preferred embodiment of the present invention, the lockable clamping device further includes a locking pin attached at one end to the lower of the pair of disc-like elements; and a locking spring fitted to the upper of the pair of disc-like elements for holding the locking pin in a locked position; the upper of the pair of disc-like elements having a channel formed therein to allow the locking pin freedom of travel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present invention will be understood and appreciated more fully from the following detailed description taken in conjunction with the appended drawings in which:

Fig. 1 is a schematic illustration of a reclinable orthopedic chair, constructed and operative in accordance with a preferred embodiment of the present invention;

Figs. 2A-2D are schematic illustrations of the chair of Fig. 1 in different operating positions;

Fig. 3 is a detailed schematic illustration of the operating device for maintaining the angle of the footrest relative to the seat portion of the chair of Fig. 1;

Figs 4A and 4B are detailed schematic illustration of the clamping device associated with the chair of Fig. 1, constructed and operative in accordance with a preferred embodiment of the present invention in its locked and open modes, respectively;

Fig. 4C is a schematic illustration of the mechanical principles of the clamping device of Figs. 4A and 4B; and

Fig 5A is a detailed schematic illustration of the clamping device associated with the chair of Fig. 1, constructed and operative in accordance with an-

other preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0015] Reference is now made to Fig. 1, which is a schematic illustration of a reclinable orthopedic chair, generally designated 10, constructed and operative in accordance with a preferred embodiment of the present invention.

[0016] The reclinable orthopedic chair 10 comprises a seat portion 12 pivotally attached to a back portion 14. The chair 10 is supported on a frame arrangement 16 which includes castors 18, or similar, for easily moving the chair. The reclinable orthopedic chair 10 further comprises a footrest 20 pivotally attached via an operating device, generally designated 22, to the front of the seat portion 12. In addition, the reclinable orthopedic chair 10 is also fitted with a lockable clamping device, generally designated 24. A handle 26 is coupled to the operating device 22 for locking and releasing the footrest 20 from the chair seat 12. The angle of the back portion 14 and the footrest 20 may be varied when the operating device 22 is in its unlocked position.

[0017] The operating device 22 and the lockable clamping device 24, which are features of the invention, will be described in further detail below.

[0018] It is a further feature of the invention that the footrest 20 remains parallel to the seat portion 12 as the reclining position of the chair and the angle of the back portion 14 alters. Reference is now made to Figs. 2A-2D which are schematic illustrations showing the chair 10 in different operating positions. Fig 2A shows the chair 10 in its upright position with the back portion 14 approximately vertical and at right angles to the seat portion 12 with the footrest 20 folded under the seat portion 12. Fig 2B shows the chair 10 in a reclining position with the back portion 14 at an obtuse angle relative to the seat portion 12. The footrest 20 extends beyond the chair and is below and parallel to the seat portion 12.

[0019] In Fig. 2C, the chair is shown in a fully reclined (approximately horizontal) position, similar to a bed. Fig 2D shows the chair 10 in a further reclining position with the back portion 14 at an obtuse angle relative to the seat portion 12. In this case, the footrest 20 extends beyond the chair but is above the seat portion 12. The footrest 20 remains parallel to the seat portion 12.

[0020] A further feature of the footrest 20 is that it is longer than the traditional footrest, comprising a substantially rectangular frame, generally referenced 34 (shown by dotted lines in Fig. 1) having four sides referenced B1.B4 and a projecting frame, generally referenced 35, referenced B5.B7.

[0021] Traditional prior art footrests are usually restricted to a configuration defined by frame B1... B4 since the operating device of prior art footrests impede the elevation of the footrest, thus restricting the size of the traditional prior art footrests. In contrast, the operating device 22, in accordance with a preferred embodiment of the invention is located outside the frame of the footrest 20 allowing a longer footrest to be attached to the chair. This feature is particularly significant for persons having shorter legs. Furthermore, the configuration of footrest and operating device in accordance with a preferred embodiment of the invention allows the raised elevation position of Fig. 2D, an elevation position for a longer footrest, which is not possible with prior art chairs.

[0022] Reference is now made to Fig. 3, which is detailed schematic illustration of the operating device 22 for maintaining the angle of the footrest 20 relative to the seat portion 12.

[0023] Seat portion 12 comprises a substantially rectangular frame, generally referenced 28 (shown by dotted lines in Fig. 1) having four sides referenced A1....A4.

[0024] The operating device 22, which is pivotally attached to the seat frame 28, comprises a substantially rectangular structure consisting of a pair of connecting elements generally referenced 30, coupled to a pair of shaft-like elements 32a and 32b.

[0025] For clarity, only part of the structure of the seat portion 12, operating device 22 and footrest 20 are shown in Fig. 3.

[0026] The clamping device 24 (Figs. 4A-4C) is suitably connected to one end of one of the pair of shaft-like elements 32a and toothed cogs 36a and 36b are suitably connected to the other end of the pair of shaft-like elements 32a and 32b. A toothed chain 38 is operatively coupled to toothed cogs 36a/36b so that the movement of the pair of shaft-like elements 32a/32b is integrally linked.

[0027] The movement of the seat 12 and/or footrest 20 are concomitant, movement being transferred by the toothed chain 38. The relative angle between the pair of shaft-like elements 32a/32b and the frame of the footrest 20 remains constant. That is, if the footrest 20 is fixed so as to be parallel to the seat frame 28, it remains parallel, at the same relative angle.

[0028] It will be appreciated that any suitable connecting device, such as strap, band or cable maybe be used in place of the toothed chain 38, shown by way of example only.

[0029] Reference is now made to Figs. 4A-4C, which is detailed illustration of lockable clamping device 24. Figs. 4A and 4B illustrate the lockable clamping device 24 in its locked and unlocked position, respectively.

[0030] The lockable clamping device 24 comprises at least two disc-like elements 40a/40b separated by a rotatable stopper 42, and a clutch device 44 comprising a plurality of springs 46, such as leaf springs. The springs 46 are restrained by a nut 48 or similar suitably connected to shaft-like element 32a. Similarly, disc-like elements 40a/40b are held in place by any suitable device such as a nut screwed on to the protruding end (G) of shaft-like element 32a. Each of the disc-like elements

40a/40b have an asymmetrical slot 50 (indicated by sides E and F) formed therein to allow the stopper 42 limited movement.

[0031] The operation of the lockable clamping device 24 can be described as follows: In its open position (Fig. 4B), disc-like elements 40a/40b are closed together while the plurality of springs 46 are separated one from the other and from the disc-like elements 40a/40b. The stopper 42 is held in place by the longer side F of slot 40 at an approximately 45° angle relative to the face of the disc-like elements 40a and 40b.

[0032] As disc-like element 40a is rotated (clockwise as shown by arrow X), stopper 42 rotates in the opposite direction (anti-clockwise) forcing disc-like elements 40a and 40b apart and simultaneously pressing the plurality of springs 46 together. Stopper 42 rotates to a position in which it is locked in place by the shorter side E of slot 40, that is at an angle greater than 90° to the face of the disc-like elements 40a and 40b (closed position Fig. 4A).

[0033] The maximum clamping pressure occurs when stopper 42 is perpendicular to the disc-like elements 40a and 40b. As the stopper is further tightened beyond the perpendicular, the lockable clamping device 24 is 'locked' preventing the device from returning t its former unlocked position without force being applied.

[0034] The principle of the lockable clamping device 24 is illustrated in Fig. 4C. Angles α, β and γ are equal. As stopper 42 is rotated anti-clockwise through angle α, the vertical movement of the plurality of springs 46 equals an amount, referenced 'd'. As the rotation continues through angle β (=α), the vertical movement of the plurality of springs 46 is less (referenced 'g'). As the rotation continues further through angle γ (=α = β), to a position where stopper 42 is approximately perpendicular, Further rotation, beyond the perpendicular (the locking travel), results in a relatively minor vertical movement (referenced 'f').

[0035] To unlock the lockable clamping device 24, the upper disc-like element 40a is rotated in the opposite anti-clockwise direction (arrow Y), thereby releasing the stopper 42 from its locked position (against side E) and thus subsequently releasing the plurality of springs 46 of clutch 44.

[0036] An alternative embodiment of a clamping device, referenced 102, is illustrated in Fig. 5A to which reference is now made. Clamping device 102 is similar to lockable clamping device 24, except that it further comprises a locking pin 104 and a locking spring 106. Elements having similar functions are similarly designated and will not be further described.

[0037] A channel 108 is formed within the upper disc-like element 40a allowing locking pin 104 a limited freedom of travel. Locking pin 102 is attached at one end to lower disc-like element 40b. The locking spring 106, which is any suitable spring-like element, is generally circular configured to match the radius of the locking pin 104 so that pin 104 becomes locked by the spring 106 when stopper 42 is in its perpendicular position, that is after stopper 42 has traveled through angles α, β and γ.

[0038] It will be appreciated by persons skilled in the art that the present invention is not limited by what has been particularly shown and described herein above. In particularly, the invention is applicable to other structures such as beds and sofas and orthopedic devices such as adjustable mattresses. Rather the scope of the invention is defined by the claims, which follow:

Claims

1. A reclinable chair comprising:

a seat portion pivotably attached to a back portion; and
a footrest pivotably attached to the front of the seat portion;

wherein the relative angle between the foot rest and the seat portion remains constant for varying angles of inclination of the chair.

2. A chair according to claim 1 and further comprising an operating device pivotally attached to the seat frame of the seat portion and fitted to said footrest, for altering the angle of inclination of said footrest.

3. A chair according to any of claims 1 or 2 and further comprising a lockable clamping device fitted to said footrest for locking and releasing said footrest, said lockable clamping device in communication with a handling device.

4. A chair according to claim 2 wherein said operating device comprises:

a substantially rectangular structure having a pair of connecting elements coupled to a pair of shaft-like elements;
a pair of toothed cogs, each of which is connected to one end of the pair of shaft-like elements; and
a connecting device operatively coupled to said toothed cogs thereby to integrally link the movement of the pair of shaft-like elements.

5. A chair according to claim 4 wherein said connecting device comprises one of a group including a toothed chain, a strap, a belt, a band and a cable.

6. A chair according to claim 3 wherein said lockable clamping device comprises:

at least two disc-like elements separated by a rotatable stopper, said at least two disc-like elements in communication with said shaft-like

elements and said rotatable stopper in communication with said handling device; and
a clutch device comprising a plurality of springs in communication with said shaft-like elements,

wherein each of the disc-like elements have an asymmetrical slot formed therein to allow the rotatable stopper limited movement.

7. A chair according to claim 6 wherein said lockable clamping device further comprises:

a locking pin attached at one end to the lower of said pair of disc-like elements; and
a locking spring fitted to the upper of said pair of disc-like elements for holding said locking pin in a locked position; said upper of said pair of disc-like elements having a channel formed therein to allow said locking pin freedom of travel.

8. A lockable clamping device comprising:

upper and lower disc-like elements separated by a rotatable stopper, said upper and lower two disc-like elements in communication with a shaft-like element, and said rotatable stopper being in communication with an operating device; and
a clutch device comprising a plurality of springs in communication with said shaft-like element,

wherein each of the disc-like elements have an asymmetrical slot formed therein to allow the rotatable stopper limited movement.

9. A device according to claim 8 wherein said lockable clamping device further comprises:

a locking pin attached at one end to said lower disc-like element; and
a locking spring fitted to said upper disc-like element for holding said locking pin in a locked position; said upper disc-like element having a channel formed therein to allow said locking pin freedom of travel.

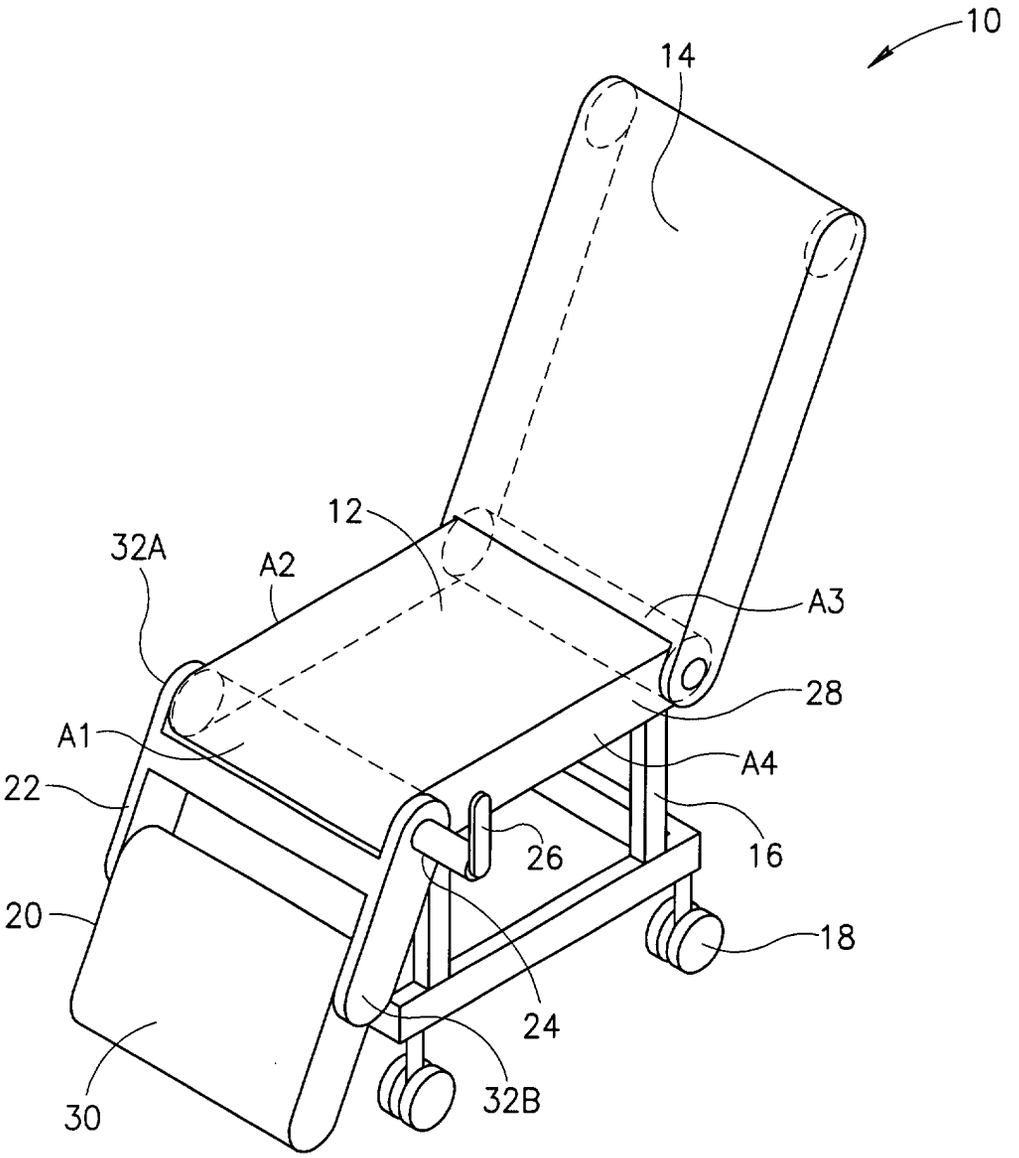

FIG.1

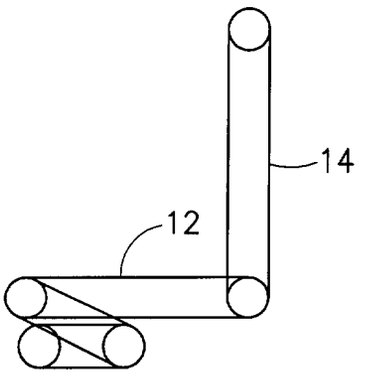

FIG.2A

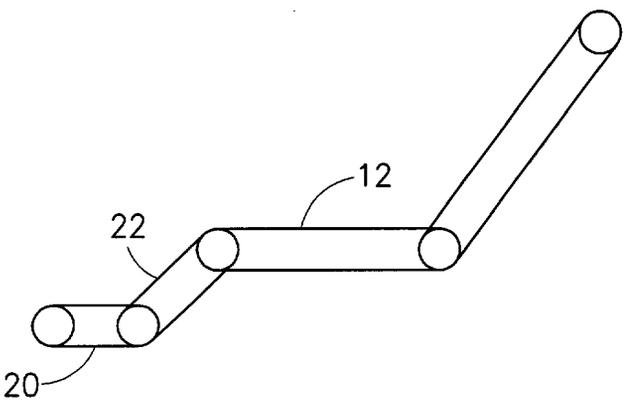

FIG.2B

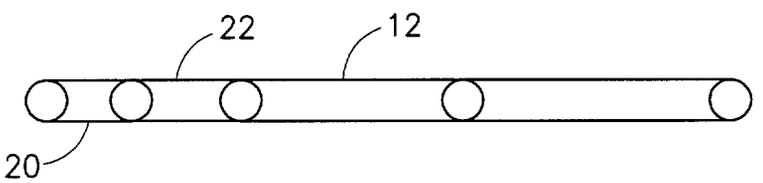

FIG.2C

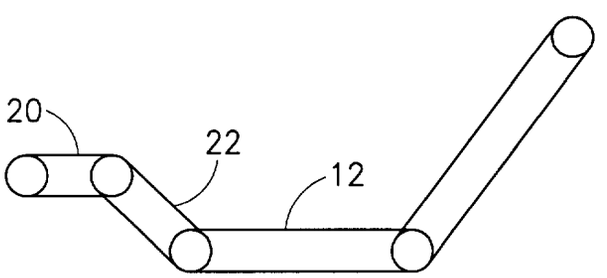

FIG.2D

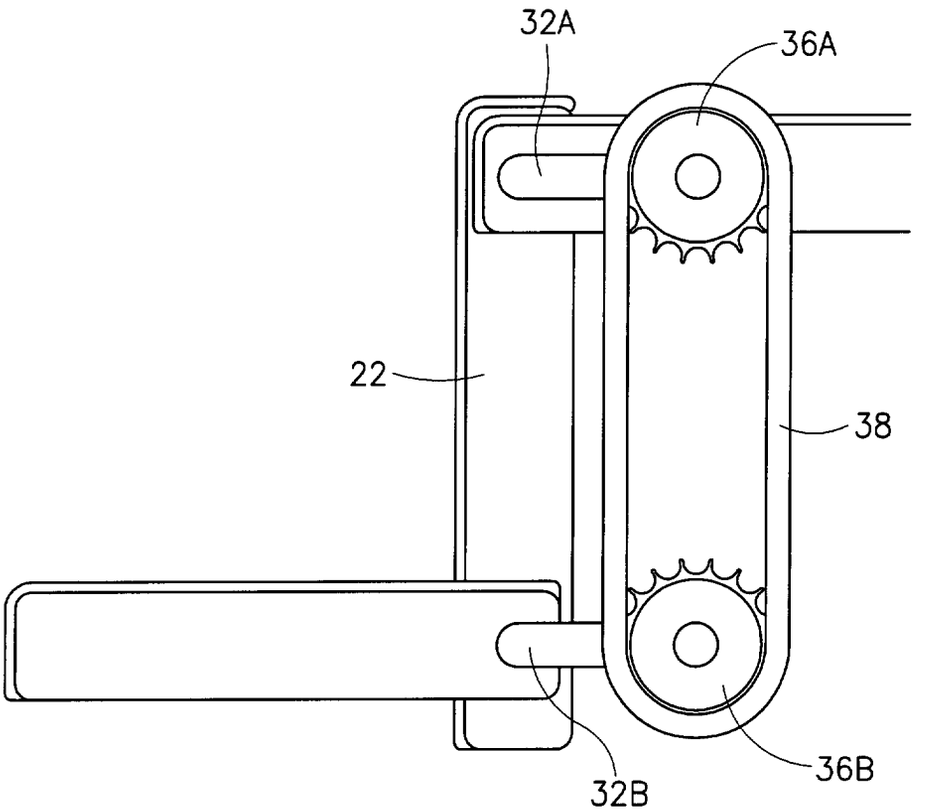

FIG.3

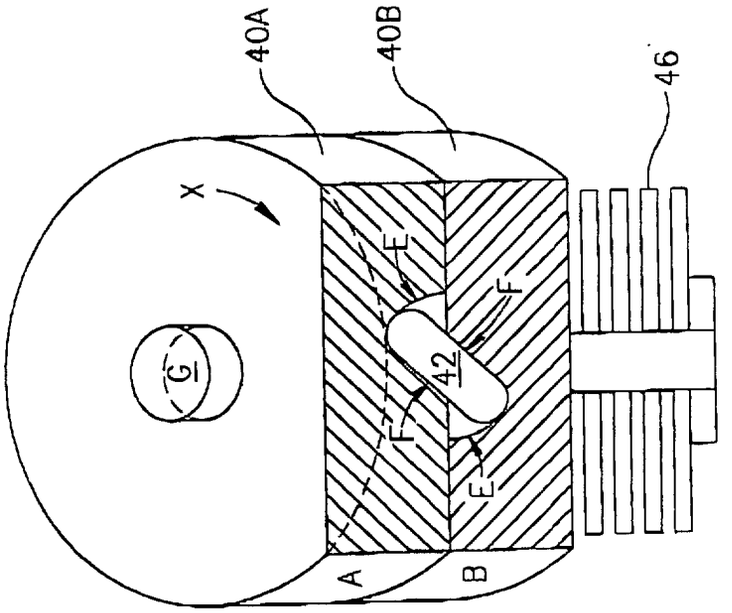

FIG.4B

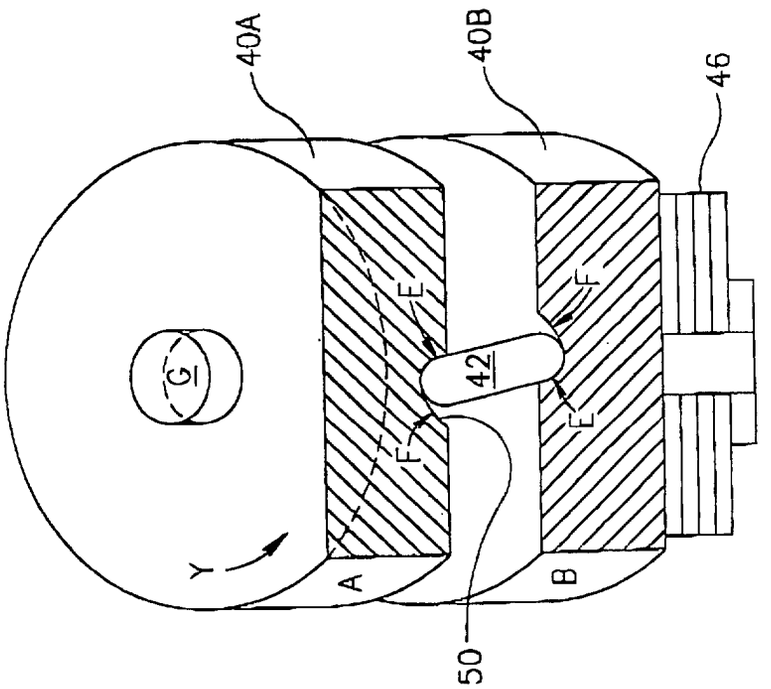

FIG.4A

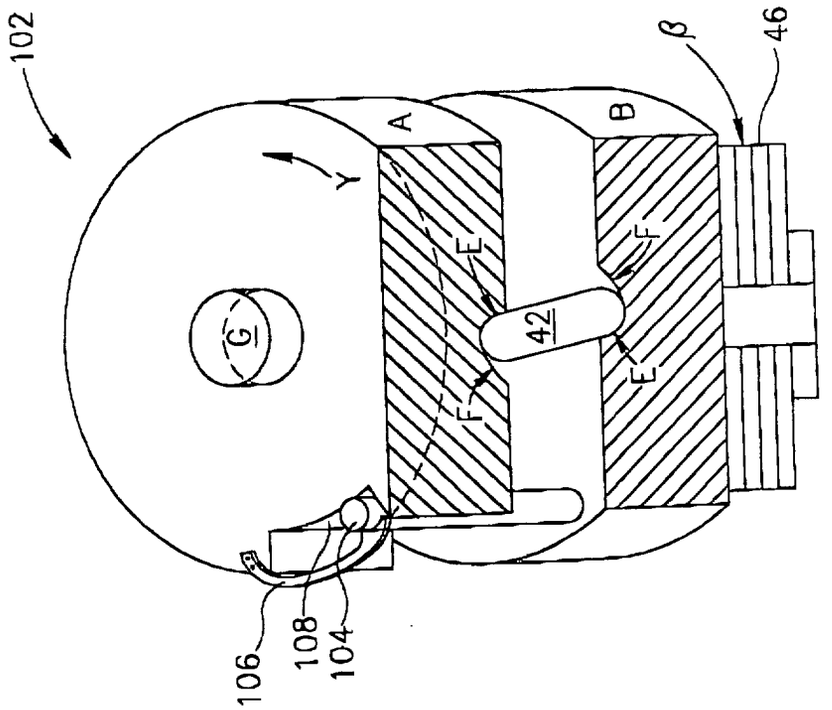

FIG.5

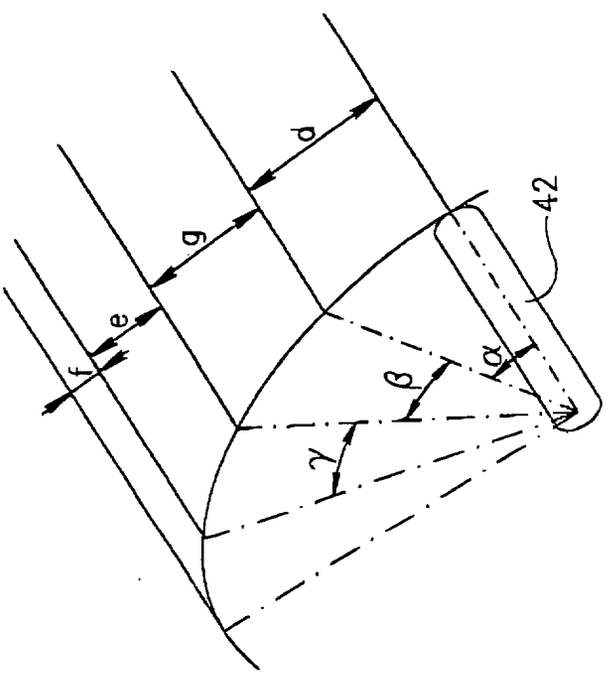

FIG.4C