(12) UK Patent (19) GB (11) 2545201 (13) B

(45) Date of B Publication 21.07.2021

(54) Title of the Invention: A saddle

(51) INT CL: ***B62J 1/00*** (2006.01)

(21) Application No: **1521610.4**

(22) Date of Filing: **08.12.2015**

(43) Date of A Publication **14.06.2017**

(56) Documents Cited:

GB 0525291 A	**WO 2008/040878 A1**
WO 1994/025331 A2	**AU 002944597 A**
DE 102013013770 A1	**US 4063775 A**

(58) Field of Search:
As for published application 2545201 A viz:
INT CL **B62J**
Other: **WPI, EPODOC**
updated as appropriate

Additional Fields
Other: **None**

(72) Inventor(s):
Alex Caccia
David Warren
Harry Mitchell

(73) Proprietor(s):
Muoverti Limited
Unit 62 Pall Mall Deposit, Balby Road, LONDON, W10 6BL, United Kingdom

(74) Agent and/or Address for Service:
Forresters IP LLP
Port of Liverpool Building, Pier Head, LIVERPOOL, L3 1AF, United Kingdom

GB 2545201 B

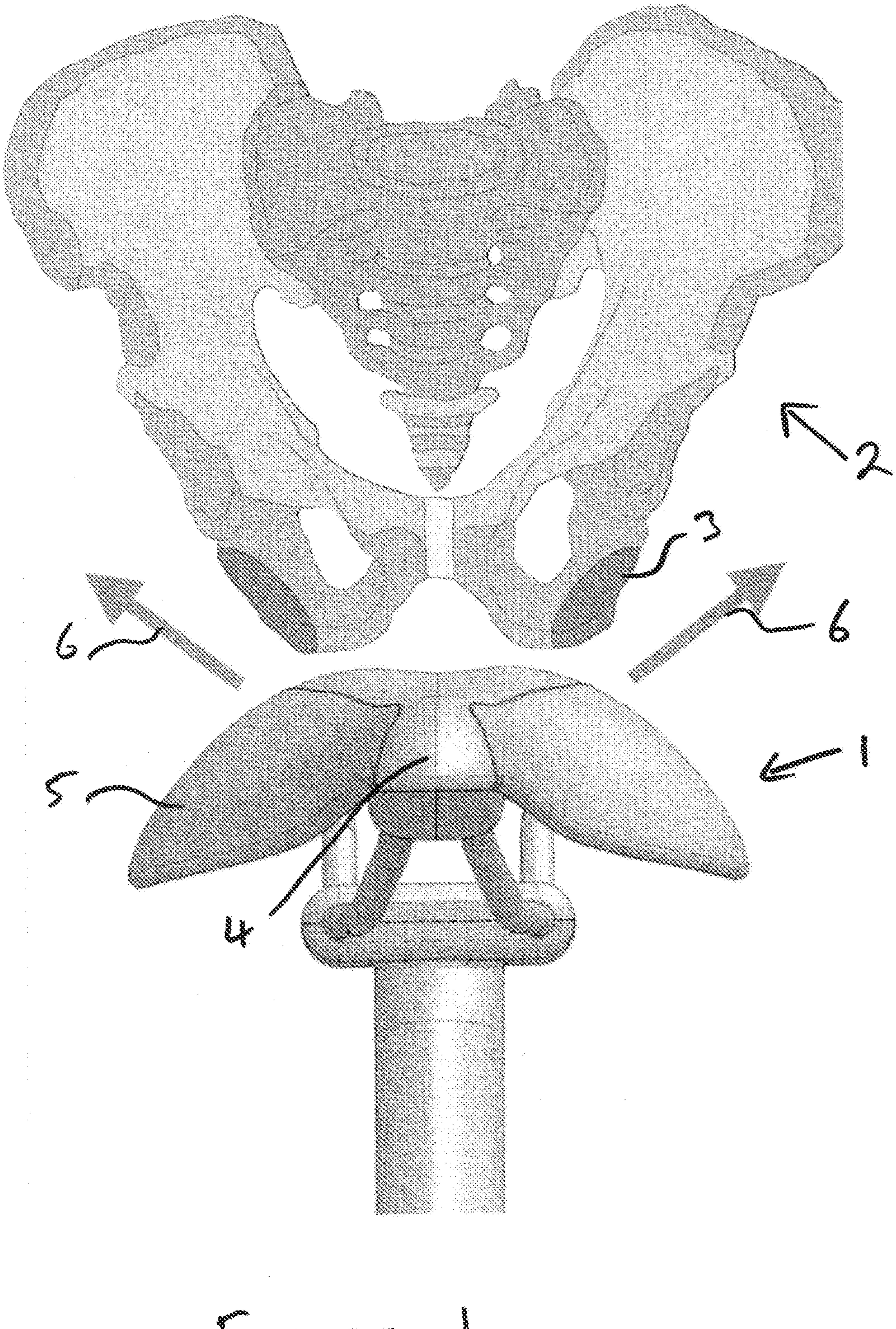

FIGURE 1

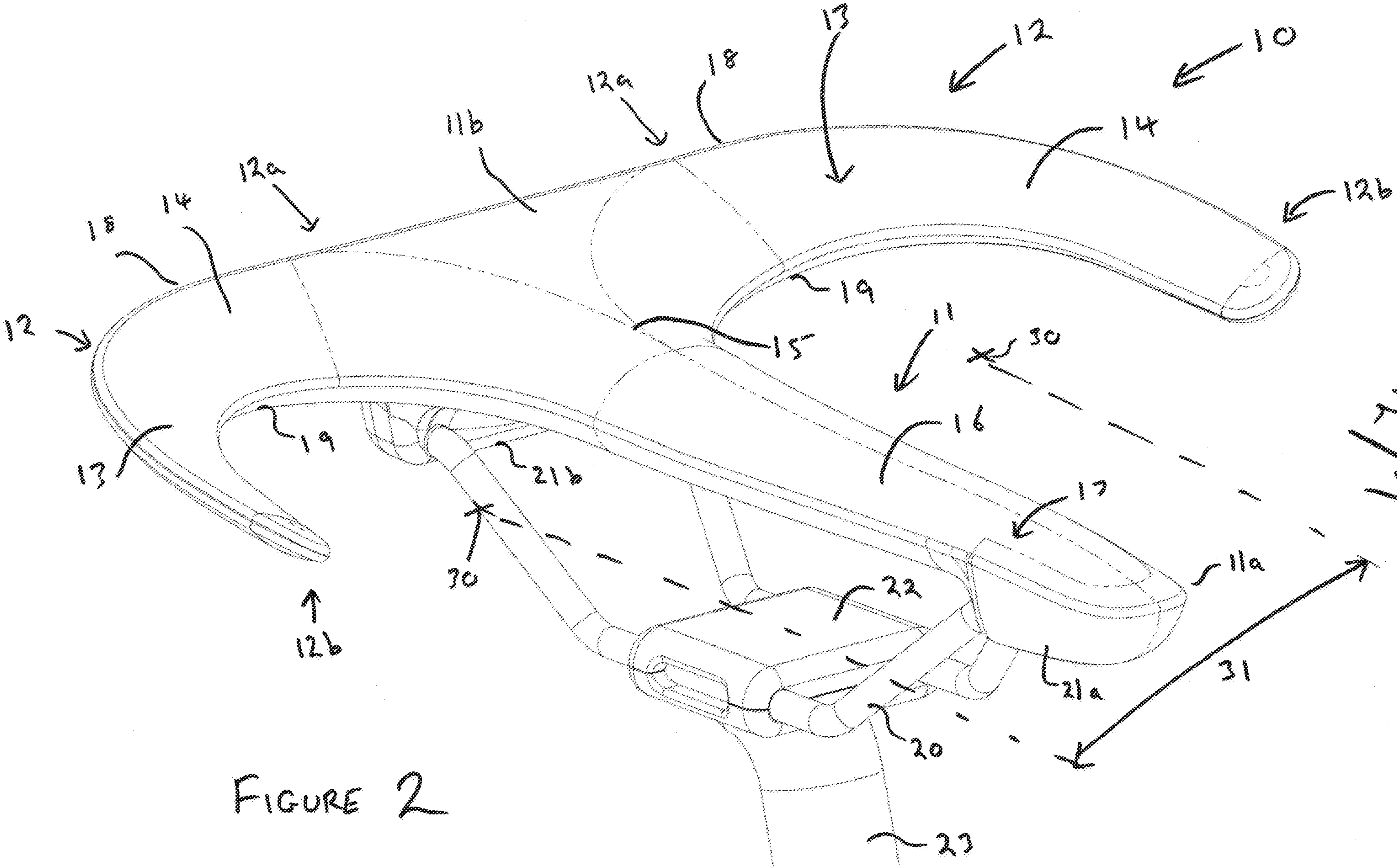
10
12
13
14
12b
18
12a
11b
12a
14
18
12
13
19
19
15
11
30
16
17
11a
21b
30
12b
22
21a
31
20
23

FIGURE 2

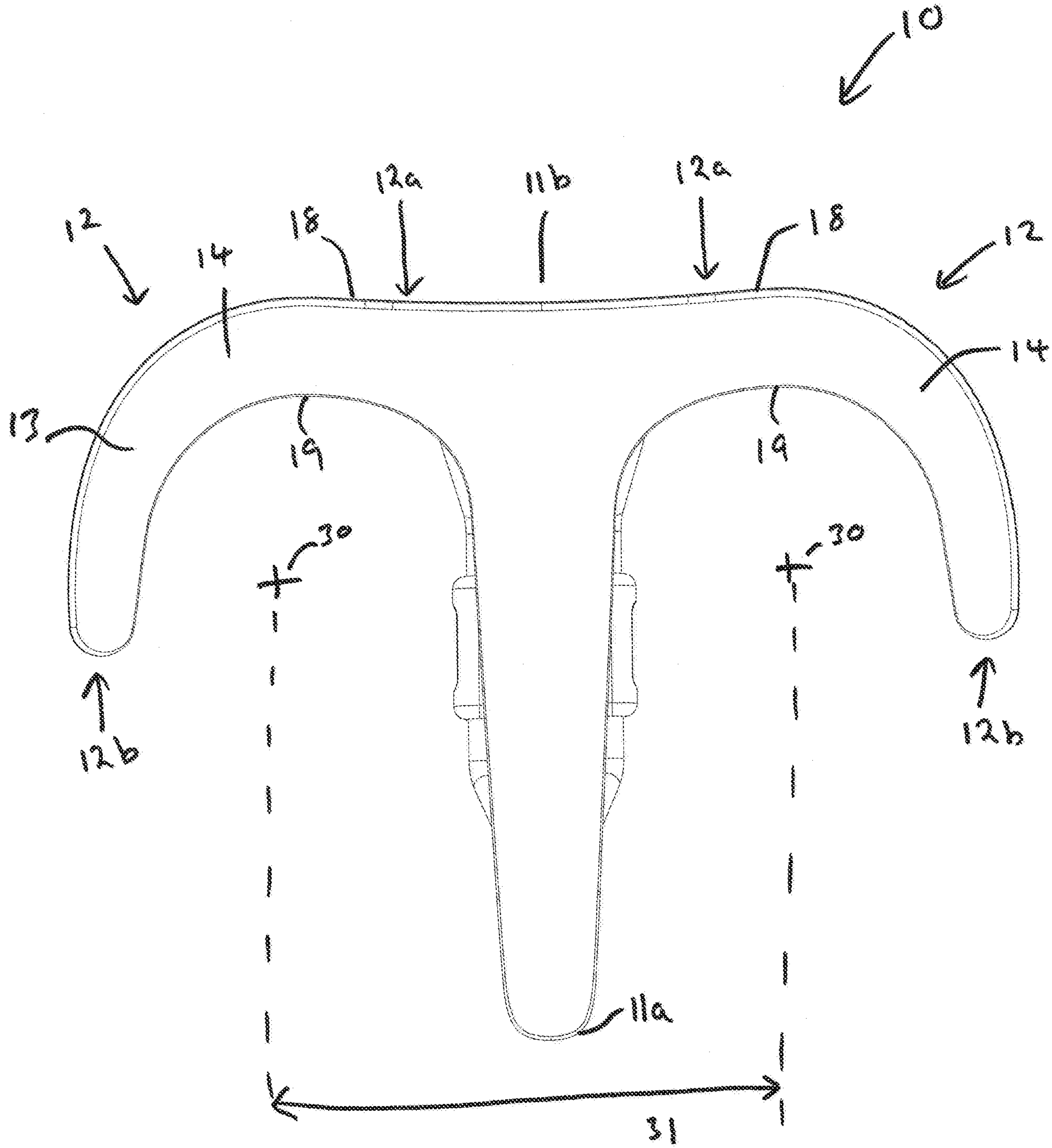

FIGURE 3

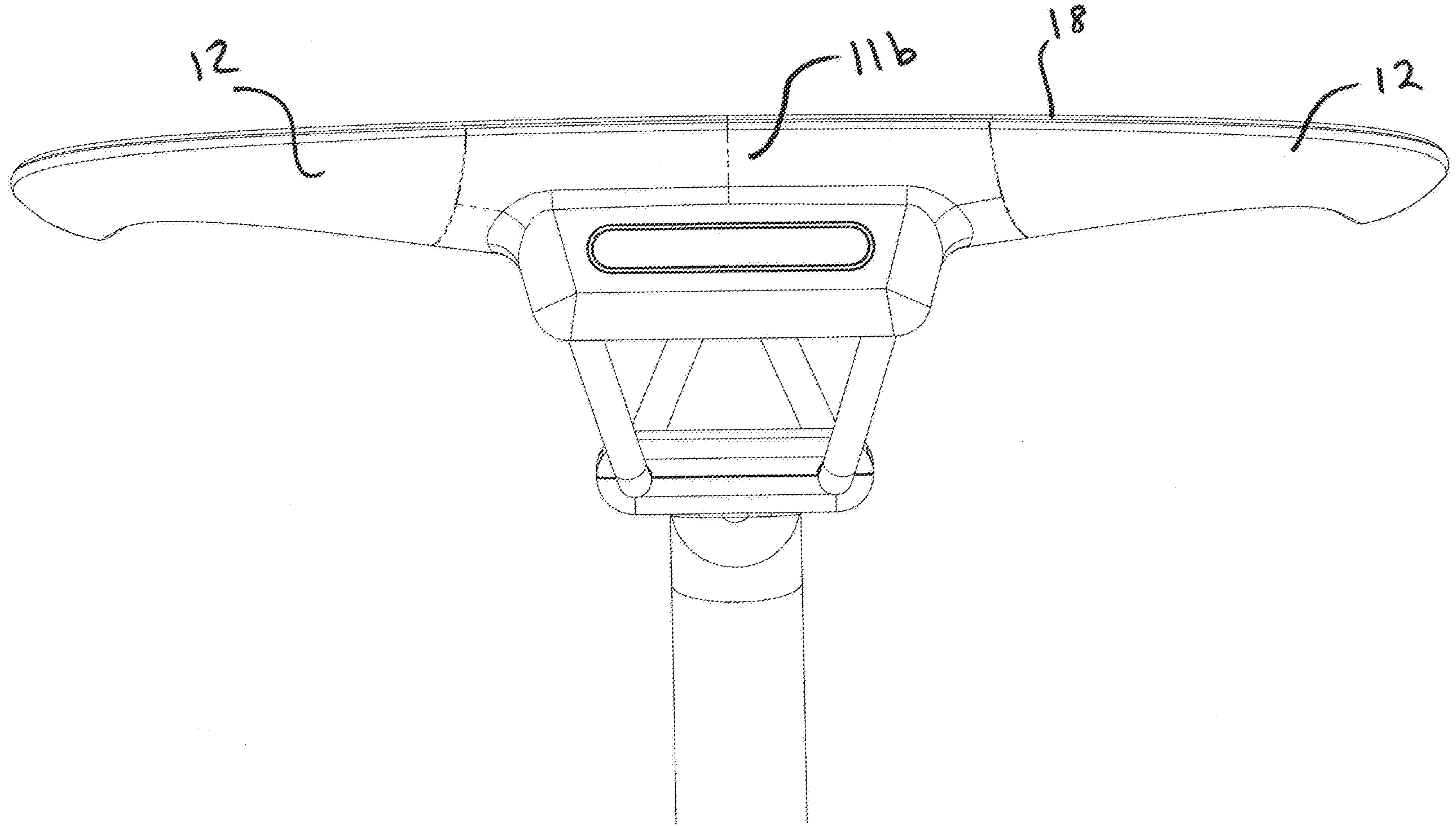

FIGURE 4

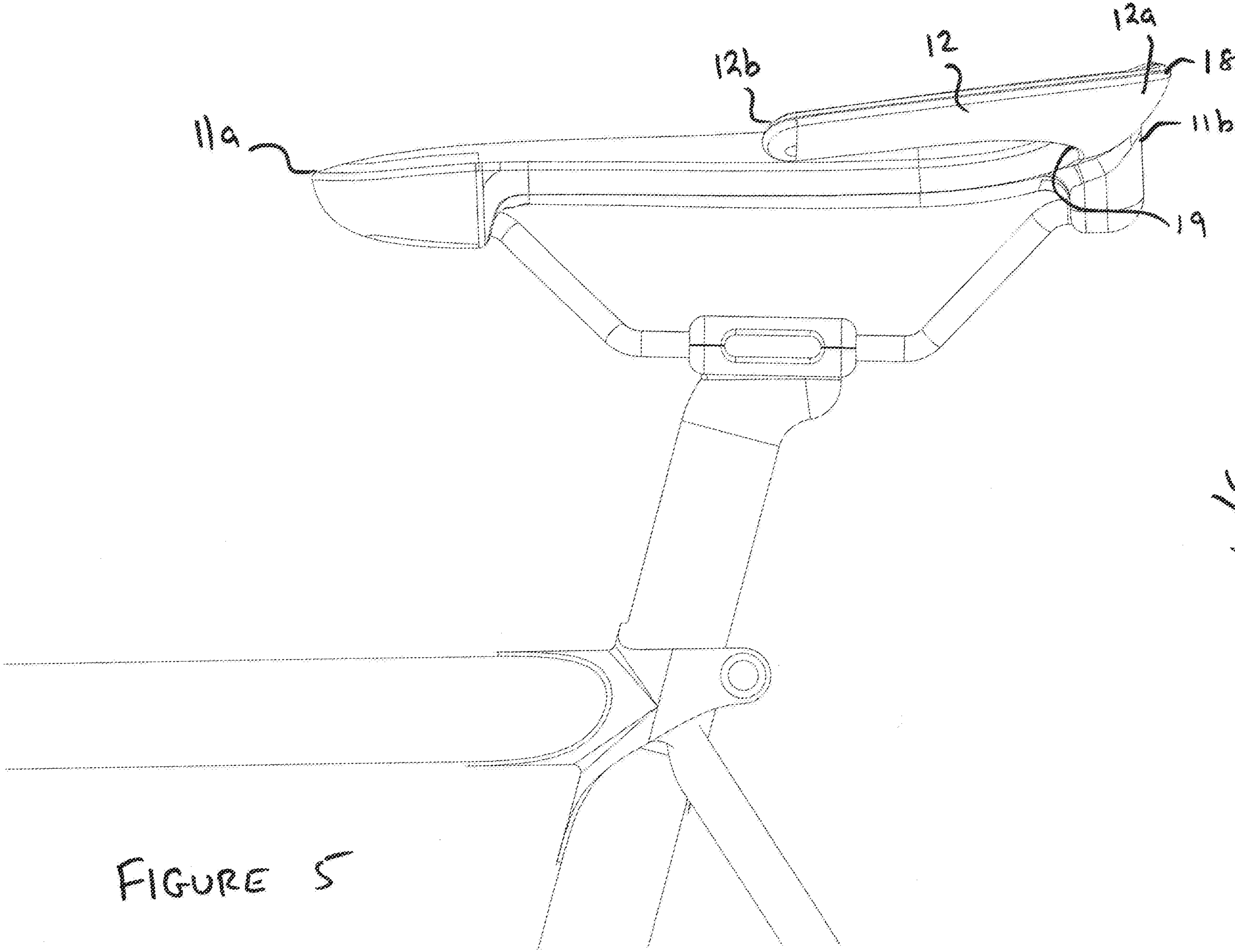

FIGURE 5

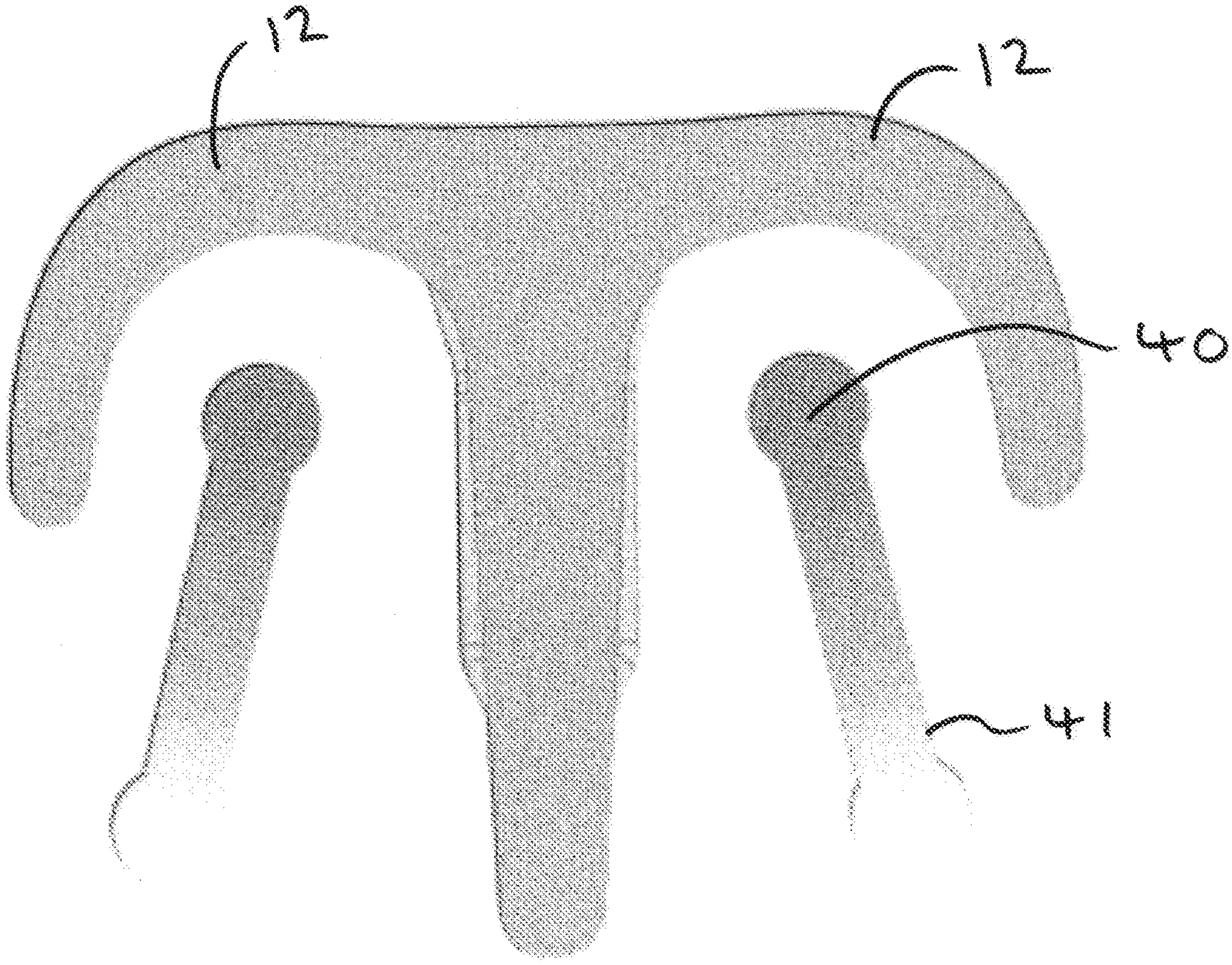

FIGURE 6

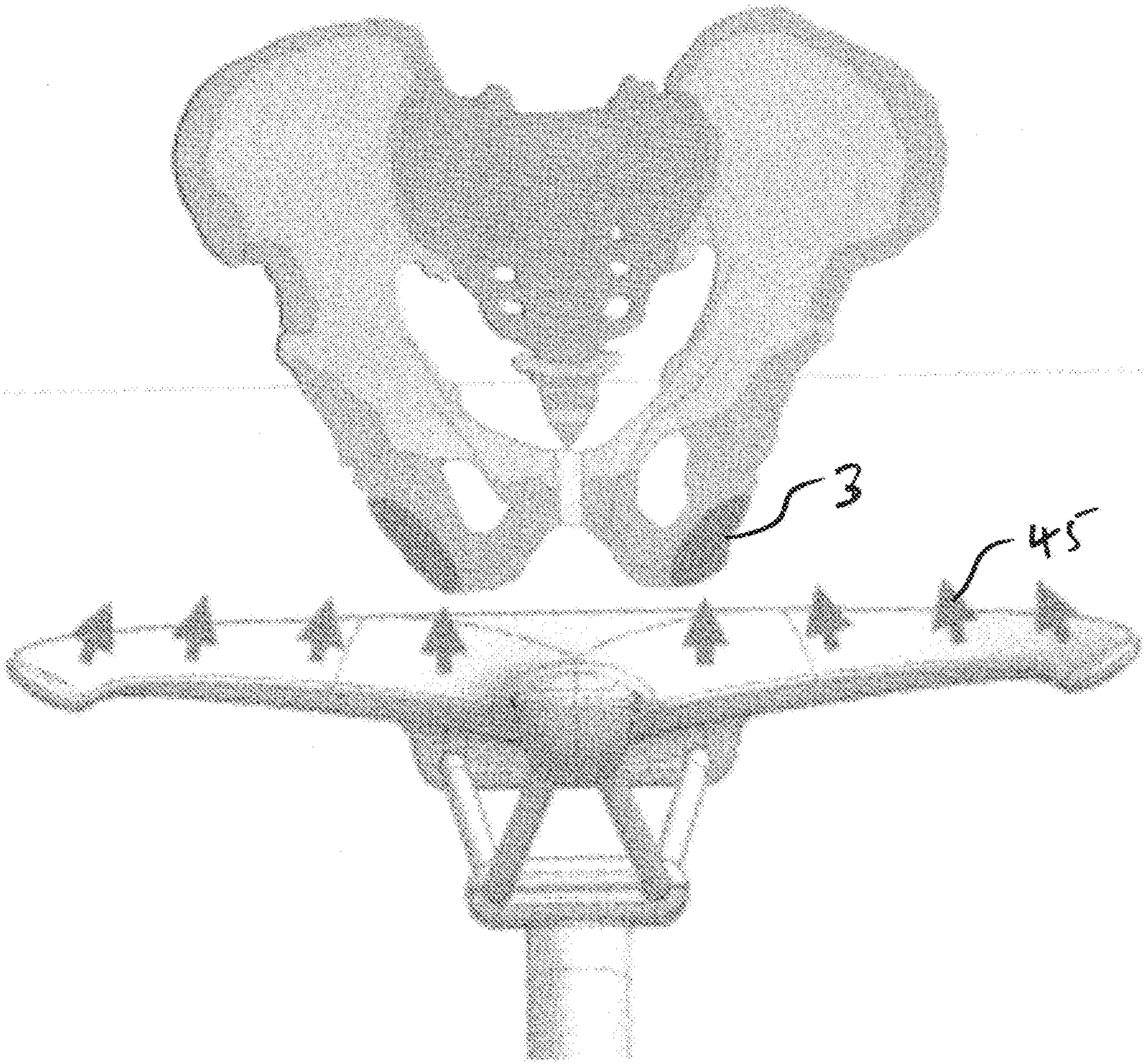

FIGURE 7

A Saddle

The present invention relates to a saddle, particularly to a saddle for a pedal bicycle.

A conventional bicycle is provided with a saddle on which the user is able to sit in use, during which the saddle at least partially supports a user's weight in a vertical direction (sitting load). When the user is providing no, or very low, power to the pedals, the saddle can support substantially all of a user's weight, generally applied to the saddle in a vertical direction. When power is being provided to the pedals by a seated user, the user applies a corresponding reactionary force in the opposing direction onto the saddle (normally in a non-vertical direction). In use, a continuously changing system of forces is applied to the saddle, either actively by the user, or 'passively' through inertial forces when accelerating, braking or turning etc.

Over time, the saddle can become uncomfortable for the user. For leisure users, known saddles can provide a relatively large surface area to support the user's weight, and/or include padding, to increase comfort. For professional cyclists, saddles are normally constrained to be small in profile, so as not to interfere with the motion of the user's legs and/or to improve the aerodynamic properties of the bicycle and/or to reduce the weight of the saddle.

Regardless of the intended nature of use, known saddles include a central, generally, elongate central body – forming a 'nose' at one end - which has a longitudinal axis generally aligned with the direction of travel. The central body sits beneath a user's pelvic arch in use, between the user's ischial tuberosiies (the "sitting bones"). Owing at least in part to the weight/anatomy of the user, the system of applied forces in use and/or the area of contact with the saddle, a conventional saddle imparts lateral forces on the respective inner faces of the ischial tuberosities. These opposing forces cause the pelvis to be pushed apart. The saddle effectively acts as a wedge between the ischial tuberosities. A relative displacement of the ischial tuberosities by just 0.5 mm can cause significant pain and numbness for the user.

The central body of a conventional saddle can also put significant pressure on the perineum, causing blood flow restriction to the genitalia, potentially causing long-term damage to the sexual organs. Use of this type of saddle design continuously over a long period of time can cause ureathal damage and penile numbness in male users.

The problems can be particularly acute with professional saddles having a low profile. The opposing forces applied to the pelvis by the central body can cause the tendons around the hip joints to tighten in sympathy. This can then restrict blood-flow, pinch the sciatic nerve and/or cause numbness in the thighs.

Various attempts have been made to provide a more comfortable seat, primarily aimed at the leisure market. For example, nose-less saddles have been proposed, which effectively provide a wide padded ‘bench’ on which the user sits, to support the user’s weight through their buttocks. The Spiderflex Recreational Saddle (REC), manufactured by Spiderflex Bike Components, Manitoba, Canada comprises two ring-shaped pads mounted to a rail, with a shock absorber mounted between the pads and the rail. A saddle with two adjustable side pads, named the ‘BiSaddle Da Vinci’ has also been proposed. Still further, it is known to provide a slot, hole or groove in the top surface of the nose of the saddle, to reduce the pressure applied to the perineum. Whilst these known saddles may provide some improvements suitable for the leisure market, they do not tend to be suitable for prolonged professional use, since they can affect the free movement of the user's legs and do not allow the efficient application of force by the user to the pedals.

The present invention seeks to provide an improved saddle.

Accordingly, the present invention provides a saddle comprising:

a substantially elongate central body having a longitudinal axis; and

a pair of flexible support wings, a first end of each wing extending generally perpendicularly from opposing sides of the central body, a second end of each wing being remote from the first end and arranged substantially parallel to the longitudinal axis of the central body, each support wing including a generally arcuate portion between the first and second ends, each wing providing a support surface for the user.

Preferably, the central body is configured such that the longitudinal axis of the central body is aligned with the direction of travel in use.

Preferably, the second end of each wing terminates at a location between the distal ends of the elongate central body.

Preferably, a portion of at least one of the first and second ends of the support wing is generally linear.

Preferably, substantially all of each wing is substantially arcuate.

Preferably, the upper surface of the central body is substantially coplanar with at least a part of the upper surface of at least a first end of the wings in the region of the intersection of the wings and the body.

Preferably, the support wings are more flexible than the main body.

Preferably, the second end of each support wing is more flexible than the first end.

Preferably, the flexibility increases from the first end to the second end.

Preferably, the flexibility increases substantially uniformly between the first and second ends

Preferably, the cross-sectional area of each wing reduces from the first end to the second end.

Preferably, the thickness of each wing reduces from the first end to the second end.

Preferably, the width of each wing reduces from the first end to the second end.

Preferably, the support surface of at least a part of each support wing is sloped inwards towards the radial centre of the arcuate portion.

Preferably, the saddle is configured such the distance between the radial centres of the arcuate portions of each respective wing is substantially equal to the distance between the user's ischial tuberosities.

Preferably, the saddle is configured such the distance between the radial centres of the arcuate portions of each respective wing is adjustable.

Preferably, the saddle is configured such the radius of the arcuate portion of each respective wing is adjustable.

Preferably, at least a part of the upper surface of the central body is flat.

07 04 21

Preferably, the wings are integrally formed with the central body.

Preferably, the wings and central body are comprised of the same material.

Preferably, at least a part of the support surface of the saddle is provided with a friction increasing material.

Preferably, the saddle further comprises a structural support member within at least a part of the central body and/or support wings.

Preferably, at least a part of the structural support member is flexible.

Preferably, the saddle further comprises a mounting rail secured to the underside of the central body.

Preferably, the saddle is symmetrical about a vertical plane passing through the longitudinal axis of the central body.

The present invention further provides a method of manufacturing a saddle, comprising

measuring the distance between a user's ischial tuberosities

providing a saddle comprising:

a substantially elongate central body having a longitudinal axis; and

a pair of flexible support wings, a first end of each wing extending generally perpendicularly from opposing sides of the central body, a second end of each wing being remote from the first end and arranged substantially parallel to the longitudinal axis of the central body, each support wing including a generally arcuate portion between the first and second ends, each wing providing a support surface for the user,

the saddle configured such that the distance between the radial centre of each respective arcuate portion is substantially equal to said measured distance between the user's ischial tuberosities.

Embodiments of the present invention will now be described, by way of non-limiting example only, with reference to the Figures in which:

FIGURE 1 illustrates some of the forces applied to the ischial tuberosities by a conventional saddle;

FIGURE 2 illustrates a saddle according to the present invention;

FIGURE 3 is a top view of the saddle of Figure 2;

FIGURE 4 is a rear view of the saddle of Figure 2;

FIGURE 5 is a side view of the saddle of Figure 2;

FIGURE 6 schematically illustrates the freedom of movement afforded to a user by a saddle embodying the present invention; and

FIGURE 7 schematically illustrates the distribution of forces by a saddle embodying the present invention.

Figure 1 illustrates a conventional saddle 1 of the type well known in the art. The saddle 1 comprises a nose section 4 which, in use, protrudes in a forwards direction. The rear of the saddle 1 is provided with two padded cushions 5. The padded cushions 5 are designed to support the soft tissue of the user's buttocks in use. The nose 4 of the conventional saddle 1 sits beneath a user's pelvic arch in use, between the user's ischial tuberosities. Also illustrated in figure 1 is a pelvic bone 2, comprising a pair of ischial tuberosities 3 at its lower end.

As described above, in use, as a user's weight is applied to the conventional saddle 1, the nose 4 can have a "wedging" effect on the user's pelvic bone, which creates two opposing forces 6 to act on the inside surfaces of the ischial tuberosities 3, which can cause significant discomfort, and/or potential injury, to the user.

A saddle 10 embodying the present invention is illustrated in figures 2 to 7.

The saddle 10 comprises a substantially elongate central body 11 having a first end 11a and a second end 11b. The central body 11 has a longitudinal axis which is aligned with the direction of travel in use. Accordingly, the first end 11a of the central body 11 is the “fore” end, and the second end 11b is the “aft” end. The fore end presents a nose of the saddle 10.

The saddle 10 further comprises a pair of support wings extending outwardly from opposing sides of the central body 11. Both wings 12 extend substantially away from each other in the same, generally horizontal, plane. Each support wing 12 comprises a first end 12a which extends outwardly from the central body 11. Each support wing 12 further comprises a second end 12b, remote from the first end 12a, and each support wing 12 further includes a generally arcuate portion 13 between the first 12a and second 12b ends. Each support wing 12 provides a wing support surface 14 for the user.

The first end 12a of each support wing 12 extends generally perpendicularly from the central body 11. That is to say the central axis of the support wings 12 at their respective first ends 12a are substantially coaxial with one another.

By virtue of the arcuate portion 13, the central axes of the second end 12b of each support wing 12 point in a different direction to that of the first ends 12a. Preferably, in the embodiment shown, the second end 12b of each support wing 12 is arranged substantially parallel to the longitudinal axis of the main body. That is to say, the second end 12b of each support wing 12 “points” generally in the same direction as the fore end 11a of the central body 11.

As illustrated in Figure 5, the second end 12b of each support wing 12 terminates at a location between the first 11a and second 11b ends of the elongate central body 11. The distance between the first end 12a and second end 12b of each support wing 12 in a direction parallel to the longitudinal axis of the central body 11 is preferably equal to half the length of the central body 11.

In one embodiment, the central axis of the first end 12a of the support wing 12 is perpendicular to the central axis of the second end 12b of the support wing 12. In one embodiment, at least one of the first 12a and second 12b ends of the support wing 12 is generally linear.

Alternatively, as substantially shown in figures 2 to 5, substantially all of each support wing 12 is substantially arcuate 13. Preferably, each support wing 12 is uniformly arcuate, having the same radial centre 30 for each support wing 12.

The elongate central body 11 comprises an upper surface 15 which, in one embodiment, is substantially flat. Either side of the upper surface 15 are sloping slide surfaces 16, which slope away from the upper surface 15. Together, the upper surface 15 and the sloping side surfaces 16 provide a central body support surface 17.

As will be noted from figures 2 to 4 particularly, the rear edges 18 of each support wing 12 at the intersection with the central body 11 are “coaxial” with one another and coincide with the second end 11b of the central body 11. Accordingly, the rear edges 18 of the support wings 12 at the intersection with the central body 11 provide a substantially straight edge. The support wings 12 further have an inner edge 19, which is provided by the arcuate portions 13. As illustrated in figure 5, the inside edge 19 is below, and in front of, the rear edge 18. As a consequence, the support surface of the support wings 12 is sloped inward facing towards the radial centre 30 of the arcuate portions 13.

There is preferably a smooth transition between the central body 11 and the support wings 14 as shown in figure 1. The upper surface 15 of the central body 11 extends towards the rear edge 18 of the support wings 12, and the side support surfaces 16 of the central body 11 smoothly transition into the wing support surface 14 of the support wings 12. In one embodiment, the upper surface 15 of the central body 11 is substantially coplanar with the rear edge 18 of the support wings 12 at the intersection with the central body 11.

Preferably, the support wings 12 are more flexible than the main body 11. Preferably, the second end 12b of each support wing 12 is more flexible than the first end 12a. Preferably, the flexibility of the support wing 12 increases from the first 12a to second 12b end. Advantageously, the flexibility increases substantially uniformly between the first end 12a to the second end 12b. That is to say, for a given flexibility of any point along the flexible support wing 12, another part of the support wing 12 closer to the second end 12b would be more flexible.

In one embodiment, the cross-sectional area of each wing 12 (taken from a vertical plane) reduces from the first end 12a to the second end 12b. Preferably, the thickness (taken in a vertical direction) of each wing 12 reduces from the first end 12a to the second end 12b. Preferably, the width of each wing 12 (taken in a substantially horizontal direction) reduces from the first end 12a to the second end 12b.

In one embodiment, any or all of the cross-sectional area, thickness and width of each wing reduces between the first end 12a and the second end 12b.

The increase in flexibility between the first end 12a and the second end 12b may be provided, at least in part due to the reduction in any or all of the cross-sectional area, thickness or width. Alternatively or additionally, the increase in flexibility between the first end 12a and second end 12b of the support wing 12 may be due to the material used to construct the support wing 12.

In one embodiment, the wings 12 are integrally formed with the central body 11. That is to say that, rather than comprising a main body 11 to which two discrete wings are “attached”, the saddle is a unitary item whose component parts are not discretely distinguishable from one another. Preferably, the wings 12 and central body 11 are comprised of the same material.

Preferably, the saddle is formed from a resilient material, such as nylon. The saddle can be manufactured using injection moulding techniques, additive manufacturing etc. In one embodiment, the saddle is formed from carbon fibre. Preferably, the saddle may be configured such that the extent of flexibility in one plane differs to the extent of flexibility in another plane. In an embodiment comprising carbon fibre, the individual fibres can be arranged during manufacture so as to determine the extent and direction of flexibility.

In one embodiment, at least part of the support surface 17, 14 of the saddle 10 may be provided with a friction increasing material, so as to increase the grip between the saddle and the user’s clothing/skin.

In one embodiment, a structural support member (not shown) may be provided with at least a part of the central body 11 and/or the support wings 12. A structural support member may be comprised of a “rod” of rigid or flexible material embedded within the material of at least one of the central body 11 and support wings 12. In one embodiment, a structural support member extends substantially all of the length of the central body 11, and additional auxiliary support members extend at least partially into the support wings 12.

The flexibility of the support wings 12 may be different in different directions. For example, the support wings 12 may substantially resist bending under lateral forces, but are more flexible when subjected to vertical component forces.

Preferably, the support wings are resilient, such that they are biased towards their resting condition. As a result, when the support wings (particularly the second end 12b of the support wings) are flexed in use, the resiliency of the support wings 12 urge the wings back to their starting position. Accordingly, in use, when a user lowers their thigh so as to apply a force to the pedal, the support wings 12 provide a reactionary force to lift the user's thigh vertically upwards.

In the embodiment shown, a pair of mounting rails 20 are secured to the underside of the central body illustrated, located at either end of the mounting rails 20 in a corresponding mounting boss 21a, 21b provided on the underside of the central body 11. Other mounting arrangements are possible. The lower side of the mounting rails 20 is captured in a clamp 22, which is either attachable to, or forms part of, a seat post 23 of conventional form. Preferably, the position of the rails 20 relative to the clamp 22 can be adjusted in use, according to the user's preference.

Preferably, the saddle 10 is symmetrical about a vertical plane passing through the longitudinal axis of the central body 11.

Preferably, the radius of the arcuate portions 13 is substantially identical across the arcuate portion, such that each part of an arcuate portion 13 shares the same radial centre 30. There is a distance 31 between the respective radial centres 30 of each support wing 12.

Preferably, the distance 31 is configured so as to be substantially equal to the distance between the user's ischial tuberosities.

In one embodiment, the distance 31 between the radial centres 30 is adjustable. Likewise, the radius of the arcuate portions 12 may be adjustable. More preferably, a saddle 10 is custom made for a particular user.

Accordingly, a method of manufacturing a saddle embodying the present invention comprises first measuring the distance between a user's ischial tuberosities. Then, a saddle 10 according to the present invention is provided, in which the saddle 10 is configured such that the distance between a radial centre 30 of each respective arcuate portion 13 is substantially equal to said measured distance between the user's ischial tuberosities.

As shown in figure 4, a second end 11b of the central portion 11 may be provided with a light 28, which is integrally formed with a rear surface of the second end 11b of the central body 11.

Figure 6 schematically illustrates the freedom of movement afforded to a user by a saddle 10 embodying the present invention. Numeral 40 denotes the general position of the lower part of a user's ischial tuberosities – preferably aligned with the centre 30 of the arcuate portions 13 - and the line 41 generally indicates the direction of a user's thigh bone in use.

It will be noted in this top view shown in figure 6 that the support wings 12 substantially define 90° of a full circle. As a result, the space between the central body 11 and wings 12 is “open”. The second ends 12b are “free” ends. There is no connection between the second ends 12b and the central body 11 other than through the arcuate portion 13 of the support wings 12.

Conveniently, the support wings 12 of the saddle 10 are shaped to “cup” the buttocks of a user, yet not apply pressure to the ischial tuberosities.

The support wings 12 are nevertheless able to flex with the user’s movement.

Conveniently, a saddle 10 embodying the present invention does not interfere with the user’s movement, and does not put undue pressure on the anatomy of the user, as redistribution of the user’s weight to the arcuate members at 12a and 12b relieves pressure on the user’s perineum.

Figure 7 shows a front view of a saddle 10 embodying the present invention illustrating the forces 45 applied to the ischial tuberosities. The illustration of figure 7 contrasts with that of the conventional saddle illustrated in figure 1.

The support wings 12 provide a distributed reactionary force to the user’s buttocks, increasing the area of contact between the saddle 10 and the user. Accordingly, there is no undue pressure on the user’s ischial tuberosities, and perineum, and there is no lateral pressure on the inner faces of the user’s ischial tuberosities.

In use, when a user is providing force to the pedals, most of the reactionary forces applied by the user to the saddle 10 are incident on the support surface 14 of the support wings 12; and there is substantially no force applied to the central body 11. When a user is resting and providing little or no power to the pedals, the central body 11 serves to provide, in conjunction with the support wings, an upward reactionary force to support the user.

Embodiments of the present invention preferably ‘hold’ or ‘cup’ the buttocks, redistributing the load so that no, or significantly less, load is applied to the perineum. The saddle preferably applies a mild inward force, whilst putting an insignificant lateral load on the inside of pelvis via the ischial tuberosities. This prevents the pelvis from being pushed apart, and results in the hip joints remaining flexible through the ride. The rider can push back on the 'wings' of the seat, which gives a comfortable force leverage, and the legs can move more freely.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A saddle comprising:

a substantially elongate central body having a longitudinal axis; and

a pair of flexible support wings, a first end of each wing extending generally perpendicularly from opposing sides of the central body, a second end of each wing being remote from the first end and arranged substantially parallel to the longitudinal axis of the central body, each support wing including a generally arcuate portion between the first and second ends, each wing providing a support surface for the user.

2. A saddle according to claim 1, wherein the central body is configured such that the longitudinal axis of the central body is aligned with the direction of travel in use.

3. A saddle according to any preceding claim, wherein the second end of each wing terminates at a location between the distal ends of the elongate central body.

4. A saddle according to any preceding claim, wherein a portion of at least one of the first and second ends of the support wing is generally linear.

5. A saddle according to any of claims 1 to 3, wherein substantially all of each wing is substantially arcuate.

6. A saddle according to any preceding claim, wherein the upper surface of the central body is substantially coplanar with at least a part of the upper surface of at least a first end of the wings in the region of the intersection of the wings and the body.

7. A saddle according to any preceding claim, wherein the support wings are more flexible than the main body.

8. A saddle according to any preceding claim, wherein the second end of each support wing is more flexible than the first end.

9. A saddle according to claim 8, wherein the flexibility increases from the first end to the second end.

10. A saddle according to claim 9, wherein the flexibility increases substantially uniformly between the first and second ends

11. A saddle according to any preceding claim, wherein the cross-sectional area of each wing reduces from the first end to the second end.

12. A saddle according to any preceding claim, wherein the thickness of each wing reduces from the first end to the second end.

13. A saddle according to any preceding claim, wherein the width of each wing reduces from the first end to the second end.

14. A saddle according to any preceding claim, wherein the support surface of at least a part of each support wing is sloped inwards towards the radial centre of the arcuate portion.

15. A saddle according to any preceding claim, configured such the distance between the radial centres of the arcuate portions of each respective wing is substantially equal to the distance between the user's ischial tuberosities.

16. A saddle according to any preceding claim, configured such the distance between the radial centres of the arcuate portions of each respective wing is adjustable.

17. A saddle according to any preceding claim, configured such the radius of the arcuate portion of each respective wing is adjustable.

18. A saddle according to any preceding claim, wherein at least a part of the upper surface of the central body is flat.

19. A saddle according to any preceding claim, wherein the wings are integrally formed with the central body.

20. A saddle according to any preceding claim, wherein the wings and central body are comprised of the same material.

21. A saddle according to any preceding claim, wherein at least a part of the support surface of the saddle is provided with a friction increasing material.

22. A saddle according to any preceding claim, further comprising a structural support member within at least a part of the central body and/or support wings.

23. A saddle according to claim 22, wherein at least a part of the structural support member is flexible.

24. A saddle according to any preceding claim, further comprising a mounting rail secured to the underside of the central body.

25. A saddle according to any preceding claim, wherein the saddle is symmetrical about a vertical plane passing through the longitudinal axis of the central body.

26. A method of manufacturing a saddle, comprising

measuring the distance between a user's ischial tuberosities

providing a saddle comprising:

a substantially elongate central body having a longitudinal axis; and

a pair of flexible support wings, a first end of each wing extending generally perpendicularly from opposing sides of the central body, a second end of each wing being remote from the first end and arranged substantially parallel to the longitudinal axis of the central body, each support wing including a generally arcuate portion between the first and second ends, each wing providing a support surface for the user, the saddle configured such that the distance between the radial centre of each respective arcuate portion is substantially equal to said measured distance between the user’s ischial tuberosities.