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(54) Title: VETERINARY PROXIMAL FEMUR FRACTURE PLATES

(57) Abstract: Bone plates are disclosed for veterinary uses. For example, the bone plates could be utilized for repairing proximal femur fractures in canines or felines. The bone plates may include various features for better accommodating the anatomy and native tissue structure of the proximal femur of an animal and may be utilized for all proximal femur fracture patterns.

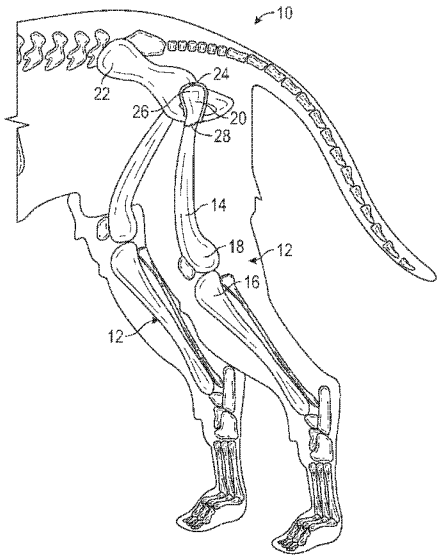

FIG. 1

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VETERINARY PROXIMAL FEMUR FRACTURE PLATES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of United States Provisional Application No. 63/607,283, which was filed on December 7, 2023 and is incorporated herein by reference in its entirety.

BACKGROUND

[0002] Canines, felines, or other animals may suffer a bone fracture as a result of a traumatic impact. Bone fractures are typically repaired using a combination of a bone plate and fixation screws.

SUMMARY

[0003] This disclosure is directed to bone plates for repairing proximal femur fractures in animals, such as canines, for example.

[0004] An exemplary proximal femur bone plate designed for veterinary use may include, *inter alia*, a shaft portion, a head portion, a bone contacting surface, and an outer surface opposed to the bone contacting surface. The head portion includes a distal section that is angled at an inclined angle relative to the shaft portion and a proximal tip section that is angled at a declined angle relative to the distal section. The inclined angle and the declined angle are configured to accommodate a curvature of a greater trochanter of a proximal femur.

[0005] Another exemplary proximal femur bone plate designed for veterinary use may include, *inter alia*, a shaft portion including a distal tip section and a proximal straight section, and a head portion including a distal section and a proximal tip section. The head portion is bounded by a peripheral edge that connects the head portion to a first side and a second side of the proximal straight section. The peripheral edge includes a first curved expanded section that connects the distal section to the first side of the proximal straight section and a second curved expanded section that connects the distal section to the second side of the proximal straight section. The first curved expanded section and the second curved expanded section are configured to accommodate a flared anatomy of a subtrochanteric region of a proximal femur.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 illustrates select portions of a canine musculoskeletal system. A proximal femur of the canine includes a fracture.

[0007] Figure 2 is a top view of a bone plate for repairing a proximal femur fracture.

[0008] Figure 3 is a bottom view of the bone plate of Figure 2.

[0009] Figure 4 is a side view of the bone plate of Figure 2.

[00010] Figure 5 illustrates the bone plate of Figures 2-4 positioned relative to a proximal femur of a canine.

[00011] Figures 6(a), 6(b), and 6(c) illustrate multiple views of a bone plate having a right orientation.

DETAILED DESCRIPTION

[00012] This disclosure is directed to bone plates designed for veterinary use. For example, the bone plates could be utilized for repairing proximal femur fractures in canines or felines. These and other features of this disclosure are described in further detail below.

[00013] An exemplary proximal femur bone plate designed for veterinary use may include, *inter alia*, a shaft portion, a head portion, a bone contacting surface, and an outer surface opposed to the bone contacting surface. The head portion includes a distal section that is angled at an inclined angle relative to the shaft portion and a proximal tip section that is angled at a declined angle relative to the distal section. The inclined angle and the declined angle are configured to accommodate a curvature of a greater trochanter of a proximal femur.

[00014] In any further embodiment, the proximal femur is a canine proximal femur, and the bone contacting surface includes a concave curvature for conforming to a contour of the canine proximal femur.

[00015] In any further embodiment, the head portion includes a first width that is greater than a second width of the shaft portion.

[00016] In any further embodiment, a plurality of openings, at least one K-wire hole, and at least one suture hole are formed through the head portion.

[00017] In any further embodiment, a plurality of openings and at least one K-wire hole are formed through the shaft portion.

[00018] In any further embodiment, the head portion is bounded by a peripheral edge that connects the head portion to a first side and a second side of the shaft portion.

[00019] In any further embodiment, the peripheral edge includes a first curved expanded section that connects the distal section to the first side of the shaft portion and a second curved expanded section that connects the distal section to the second side of the shaft portion.

[00020] In any further embodiment, the first curved expanded section and the second curved expanded section are configured to accommodate a flared anatomy of a subtrochanteric region of the proximal femur.

[00021] In any further embodiment, a first opening is provided proximate the first curved expanded section and a second opening is provided proximate the second curved expanded section.

[00022] In any further embodiment, the peripheral edge includes a first straight section that extends between the first curved expanded section and a curved tip of the proximal tip section.

[00023] In any further embodiment, the peripheral edge includes a second straight section that extends between the second curved expanded section and the curved tip of the proximal tip section.

[00024] In any further embodiment, the shaft portion includes a distal tip section that is angled relative to a proximal straight section of the shaft portion.

[00025] In any further embodiment, the head portion is angled to the left or to the right relative to the proximal straight section of the shaft portion.

[00026] In any further embodiment, the head portion includes a cobra head-like appearance.

[00027] In any further embodiment, a plurality of undercut portions are formed in the shaft portion and the head portion.

[00028] Another exemplary proximal femur bone plate designed for veterinary use may include, *inter alia*, a shaft portion including a distal tip section and a proximal straight section, and a head portion including a distal section and a proximal tip section. The head portion is bounded by a peripheral edge that connects the head portion to a first side and a second side of the proximal straight section. The peripheral edge includes a first curved expanded section that connects the distal section to the first side of the proximal straight section and a second curved expanded section that connects the distal section to the second side of the proximal straight section. The first curved expanded section and the second curved expanded section are configured to accommodate a flared anatomy of a subtrochanteric region of a proximal femur.

[00029] In any further embodiment, the distal tip section is angled relative to the proximal straight section of the shaft portion.

[00030] In any further embodiment, the head portion is angled to the left or to the right relative to the proximal straight section of the shaft portion.

[00031] In any further embodiment, the distal section of the head portion is angled at an inclined angle relative to the proximal straight section of the shaft portion, and the proximal tip section is angled at a declined angle relative to the distal section.

[00032] In any further embodiment, the inclined angle and the declined angle are configured to accommodate a curvature of a greater trochanter of the proximal femur.

[00033] Figure 1 schematically illustrates select portions of a musculoskeletal system 10 of an animal. In an embodiment, the musculoskeletal system 10 is that of a canine. However, the teachings of this disclosure may be applicable for other veterinary uses, such as for felines, for example.

[00034] Hind limbs 12 of the musculoskeletal system 10 are specifically illustrated in Figure 1. Each hind limb 12 includes, among other bones, a femur 14 and a tibia 16 positioned distally of the femur 14. A distal section 18 of the femur 14 interfaces with the tibia 16 to establish a knee joint of the animal. The distal section 18 may be simply referred to as the distal femur. A proximal section 20 of the femur 14 interfaces with an ilium 22 to establish a hip joint of the animal. The proximal section 20 may be simply referred to as the proximal femur. The ilium 22 includes an acetabulum 24 that forms a cup configured to receive a femoral head 26 of the proximal section 20 of the femur 14. The femoral head 26 may articulate relative to the acetabulum 24 as part of a ball-and-socket joint of the hip joint.

[00035] As schematically illustrated, a fracture 28 can occur in the proximal section 20 of the femur 14, such as in response to a traumatic impact. The fracture 28 may present itself in various forms and could result in one or more bone fragments breaking away from the proximal section 20 of the femur 14. Whatever pattern exhibited by the fracture 28, the fracture 28 typically must be repaired in order to alleviate pain and facilitate proper bone healing. The fracture 28 may be repaired using a bone plate. This disclosure is therefore directed to bone plate designs that are specifically suited for repairing proximal femur fractures of animals (e.g., non-humans such as canines and felines).

[00036] Figures 2-5 illustrate an exemplary bone plate 30 for repairing a fracture 28 of a proximal section 20 of a femur 14 of an animal, such as a canine or feline, for example. The bone plate 30 is shown alone in Figures 2-4, and the bone plate 30 is shown positioned relative to the proximal section 20 of the femur 14 in Figure 5.

[00037] The bone plate 30 may extend along a longitudinal axis A between a shaft portion 32, located distally and configured to interface with a diaphysis 36 of the femur 14 when the bone plate 30 is implanted, and a head portion 34, located proximally and configured to interface with a greater trochanter 38 of the proximal femur when the bone plate 30 is implanted (see, e.g., Figure 5). Together, the shaft portion 32 and the head portion 34 establish a single-piece bone plate structure.

[00038] The bone plate 30 may be specifically sized and shaped for use relative the proximal section 20 of the femur 14 of a canine or a feline, for example. In particular, the bone plate 30 may be anatomically contoured to the proximal femur in each of an X-axis, Y-axis, and Z-axis of a cartesian coordinate system 25 for accommodating multiple breed sizes and shapes.

[00039] The bone plate 30 includes an overall length L1. The overall length L1 may be specifically sized for use relative the proximal section 20 of the femur 14 of a canine or a feline, for example.

[00040] The shaft portion 32 may include a length L2, and the head portion 34 may include a length L3. In an embodiment, the length L2 is larger than the length L3. The shaft portion 32 may be either non-scalloped or scalloped along its length L2.

[00041] The head portion 34 may be broader than the shaft portion 32. For example, the head portion 34 may include a maximum width W1 that is larger than a maximum width W2 of the shaft portion 32.

[00042] The bone plate 30 may include a bone contacting surface 44 and an outer surface 46 on an opposite side of the bone plate 30 from the bone contacting surface 44. The bone contacting surface 44 may include a slightly concave curvature for conforming to the contour of the proximal section 20 and the diaphysis 36 of the femur 14. In some implementations, a radius of the outer surface 46 may be substantially flattened and a radius of the bone contacting surface 44 may be decreased in order to increase the material thickness and thus provide additional strength/stiffness without the need to either thicken or widen the bone plate 30 substantially.

[00043] The shaft portion 32 of the bone plate 30 may include a distal tip section 40 and a proximal straight section 42. The distal tip section 40 may be angled relative to the proximal straight section 42 to establish a slight kickout within the shaft portion 32 for providing a more optimized shape for accommodating the procurvatum contour of the diaphysis 36 of the femur 14. The distal tip section 40 may extend at an angle α relative to the proximal straight section 42. In an embodiment, the angle α is between about 5 degrees and about 10 degrees. In another embodiment, the angle α is about 7 degrees. However, the angle α may be optimized for suitability relative to any type of animal. In this disclosure, the term "about" means that the expressed quantities or ranges need not be exact but may be approximated and/or larger or smaller, reflecting acceptable tolerances, conversion factors, measurement error, etc.

[00044] The head portion 34 of the bone plate 30 may be angled (in the Y-axis direction) relative to the proximal straight section 42 of the shaft portion 32. The head portion 34 may extend at an angle β relative to the proximal straight section 42. In an embodiment, the angle β is about 5 degrees. However, the angle β may be optimized for suitability relative to any type of animal.

[00045] The head portion 34 of the bone plate 30 may include a distal section 48 and a proximal tip section 50. The distal section 48 is located between the proximal straight section 42 and the proximal tip section 50 and thus establishes the interface between the shaft portion 32 and the head portion 34.

[00046] The longitudinal axis A may bisect the proximal straight section 42 of the shaft portion 32 into two equal sections such that the proximal straight section 42 is substantially symmetrical about the longitudinal axis A. The distal section 48 and the proximal tip section 50 of the head portion 34 may each be asymmetrically disposed about the longitudinal axis A.

[00047] The distal section 48 of the head portion 34 may extend at an inclined angle γ (in the Z-axis direction, see Figure 4) relative to the proximal straight section 42 of the shaft portion 32. In an embodiment, the distal section 48 is angled at an inclined angle γ of between about 10 degrees and about 20 degrees relative to the proximal straight section 42. In another embodiment, the inclined angle γ is about 20 degrees. However, other angles may be suitable within the scope of this disclosure.

[00048] The proximal tip section 50 may extend at a declined angle Θ relative to the distal section 48 of head portion 34 (in the Z-axis direction, see Figure 4). In an embodiment, the proximal tip section 50 is angled at a declined angle Θ of between about 5 degrees and about 45

degrees relative to the distal section 48. However, other angles may be suitable within the scope of this disclosure.

[00049] The head portion 34 of the of the bone plate 30 may be bounded by a peripheral edge 52 that extends from a first side 54 of the proximal straight section 42 of the shaft portion 32 to a second side 56 of the proximal straight section 42 that is opposite of the first side 54. The peripheral edge 52 may connect to and extend outwardly of the first side 54 of the proximal straight section 42 to establish a first curved expanded section 58 of the distal section 48 of the head portion 34. From the first curved expanded section 58, the peripheral edge 52 may continue linearly to establish a first straight section 60 of the proximal tip section 50 of the head portion 34. The peripheral edge 52 may extend from the first straight section 60 about a curved tip 62 of the proximal tip section 50 and then linearly along a second straight section 64 that is positioned on an opposite side of the proximal tip section 50 from the first straight section 60.

[00050] The peripheral edge 52 may additionally connect to and extend outwardly of the second side 56 of the proximal straight section 42 to establish a second curved expanded section 66 of the distal section 48 of the head portion 34. The second curved expanded section 66 may connect to the second straight section 64 of the proximal tip section 50 of the head portion 34.

[00051] The inclined angle γ, the declined angle Θ, and the first and second curved expanded sections 58, 66 may cooperate to establish a cobra head-like appearance (e.g., single or dual cobra-head) of the head portion 34 of the bone plate 30. The head portion 34 is therefore configured to be anatomically contoured to the proximal femur. For example, the inclined angle γ and the declined angle Θ of the head portion 34 may cooperate to better accommodate the curvature of the greater trochanter 38 of the proximal section 20 of the femur 14, and the first and second curved expanded sections 58, 66 are designed to better accommodate the flared anatomy of a subtrochanteric region 68 (see Figure 5) of the femur 14.

[00052] The shaft portion 32 of the bone plate 30 may include a plurality of openings 70 each configured for receiving a fixation device 72 (e.g. screws, etc., shown in Figure 5 but not in Figures 2-4) for fixating the bone plate 30 to the diaphysis 36 of the femur 14. The openings 70 extend completely through the shaft portion 32 and therefore open through both the bone contacting surface 44 and the outer surface 46. In an embodiment, the proximal straight section 42 of the shaft portion 32 includes seven openings 70 that are equally sized and aligned relative to one another along the longitudinal axis A, and the distal tip section 40 of the shaft portion 32

includes three equally sized openings 70. However, other configurations are also contemplated, and thus the total number of openings 70 and their specific arrangement within the shaft portion 32 are not intended to limit this disclosure.

[00053] A first cluster of openings 74 may be formed in the distal section 48 of the head portion 34, and a second cluster of openings 76 may be formed in the proximal tip section 50 of the head portion 34. The openings 74, 76 may each be configured for receiving additional fixation devices 72 (e.g. screws, etc.) for fixating the bone plate 30 to the proximal femur. The openings 74, 76 extend completely through the head portion 34 and therefore open through both the bone contacting surface 44 and the outer surface 46.

[00054] In an embodiment, the distal section 48 includes three openings 74 that are equally sized and positioned in a clustered arrangement for maximizing bone purchase within the proximal femur. One of the openings 74 may be provided proximate to the first curved expanded section 58, another of the openings 74 may be provided proximate to the second curved expanded section 66, and yet another of the openings 74 may be provided distal to the other two openings 74 of the clustered arrangement. However, other configurations are also contemplated, and thus the total number of openings 74 and their specific arrangement within the distal section 48 are not intended to limit this disclosure.

[00055] The opening 74 of the distal section 48 that is distal to the two other openings 74 of the distal section 48 may be an angled opening that is designed to maximize bone purchase into a neck portion of the proximal femur. In an embodiment, this distally-most located opening 74 is angled at an angle between about 5 degrees and about 15 degrees relative to a transverse axis that is perpendicular to the longitudinal axis A of the bone plate 30. However, other angles may also be suitable depending on a given breed size and shape.

[00056] In another embodiment, the proximal tip section 50 includes three openings 76 that are equally sized and positioned in a clustered arrangement for maximizing bone purchase within the proximal femur. However, other configurations are also contemplated, and thus the total number of openings 76 and their specific arrangement within the proximal tip section 50 are not intended to limit this disclosure.

[00057] The bone plate 30 may additionally include one or more K-wire holes 78 configured for receiving a K-wire (not shown) in order to temporarily secure the bone plate 30 to the femur 14 prior to achieving final fixation via the fixation devices 72. The K-wire holes 78 extend

completely through the bone plate 30 and therefore open through both the bone contacting surface 44 and the outer surface 46. In an embodiment, the bone plate 30 includes one K-wire hole 78 formed in shaft portion 32 (e.g., within the distal tip section 40) and one K-wire hole 78 formed in the head portion 34 (e.g., within the proximal tip section 50). However, the total number and placement of the K-wire holes 78 provided in the bone plate 30 is not intended to limit this disclosure.

[00058] The bone plate 30 may additionally include one or more suture holes 80 configured for receiving a suture or other threadlike material. For example, suture (not shown) may be passed through various muscles (e.g., vastus lateralis of quadricep) associated with the femur 14 and then passed through the suture holes for securing the muscles during surgical closure. In an embodiment, the suture hole 80 is formed through the bone plate 30 at an interface between the distal section 48 and the proximal tip section 50 of the head portion 34. However, other placement locations could be implemented and therefore are contemplated within the scope of this disclosure.

[00059] A plurality of undercut portions 82 (see Figures 3 and 4) may be formed in the bone plate 30 (e.g., in both the shaft portion 32 and the head portion 34) on the bone contacting surface 44. The undercut portions 82 are configured to minimize bone contact at certain locations of the bone plate 30, thereby creating a more homogenous cross-sectional area across the bone plate 30 in order to reduce stress concentration at the bone plate openings and improve mechanical properties.

[00060] The bone plate 30 may be made from any biocompatible material or combination of biocompatible materials. Exemplary materials that may be suitable for manufacturing the bone plate 30 include, but are not limited to, titanium, titanium alloys, stainless steel, thermoplastic materials, etc.

[00061] In the above embodiment, the bone plate 30 is shown and described as having a left orientation. However, the bone plate 30 could also be provided in a right orientation, with such a bone plate being the mirror image of the left orientated bone plates described above. Figures 6(a), 6(b), and 6(c) illustrate an exemplary proximal femur bone plate 30-2 having a right orientation.

[00062] The bone plates of this disclosure provide a more anatomic, easier to use, and more stable bone plate for repairing proximal femur fractures of animals compared to prior plate designs. The proposed bone plates may be utilized for all proximal femur fracture patterns and include

various design features for specifically accommodating the contour and native tissue anatomy of the proximal femur.

[00063] Although the different non-limiting embodiments are illustrated as having specific components or steps, the embodiments of this disclosure are not limited to those particular combinations. It is possible to use some of the components or features from any of the non-limiting embodiments in combination with features or components from any of the other non-limiting embodiments.

[00064] It should be understood that like reference numerals identify corresponding or similar elements throughout the several drawings. It should further be understood that although a particular component arrangement is disclosed and illustrated in these exemplary embodiments, other arrangements could also benefit from the teachings of this disclosure.

[00065] The foregoing description shall be interpreted as illustrative and not in any limiting sense. A worker of ordinary skill in the art would understand that certain modifications could come within the scope of this disclosure. For these reasons, the following claims should be studied to determine the true scope and content of this disclosure.

CLAIMS

What is claimed is:

1. A proximal femur bone plate designed for veterinary use, comprising:

a shaft portion;

a head portion;

a bone contacting surface; and

an outer surface opposed to the bone contacting surface,

wherein the head portion includes a distal section that is angled at an inclined angle relative to the shaft portion and a proximal tip section that is angled at a declined angle relative to the distal section,

wherein the inclined angle and the declined angle are configured to accommodate a curvature of a greater trochanter of a proximal femur.

2. The proximal femur bone plate as recited in claim 1, wherein the proximal femur is a canine proximal femur, and further wherein the bone contacting surface includes a concave curvature for conforming to a contour of the canine proximal femur.

3. The proximal femur bone plate as recited in claim 1, wherein the head portion includes a first width that is greater than a second width of the shaft portion.

4. The proximal femur bone plate as recited in claim 1, comprising a plurality of openings, at least one K-wire hole, and at least one suture hole formed through the head portion.

5. The proximal femur bone plate as recited in claim 1, comprising a plurality of openings and at least one K-wire hole formed through the shaft portion.

6. The proximal femur bone plate as recited in claim 1, wherein the head portion is bounded by a peripheral edge that connects the head portion to a first side and a second side of the shaft portion.

7. The proximal femur bone plate as recited in claim 6, wherein the peripheral edge includes a first curved expanded section that connects the distal section to the first side of the shaft portion and a second curved expanded section that connects the distal section to the second side of the shaft portion.

8. The proximal femur bone plate as recited in claim 7, wherein the first curved expanded section and the second curved expanded section are configured to accommodate a flared anatomy of a subtrochanteric region of the proximal femur.

9. The proximal femur bone plate as recited in claim 8, comprising a first opening proximate the first curved expanded section and a second opening proximate the second curved expanded section.

10. The proximal femur bone plate as recited in claim 7, wherein the peripheral edge includes a first straight section that extends between the first curved expanded section and a curved tip of the proximal tip section.

11. The proximal femur bone plate as recited in claim 10, wherein the peripheral edge includes a second straight section that extends between the second curved expanded section and the curved tip of the proximal tip section.

12. The proximal femur bone plate as recited in claim 1, wherein the shaft portion includes a distal tip section that is angled relative to a proximal straight section of the shaft portion.

13. The proximal femur bone plate as recited in claim 12, wherein the head portion is angled to the left or to the right relative to the proximal straight section of the shaft portion.

14. The proximal femur bone plate as recited in claim 1, wherein the head portion includes a cobra head-like appearance.

15. The proximal femur bone plate as recited in claim 1, comprising a plurality of undercut portions formed in the shaft portion and the head portion.

16. A proximal femur bone plate for veterinary use, comprising:

a shaft portion including a distal tip section and a proximal straight section; and

a head portion including a distal section and a proximal tip section;

wherein the head portion is bounded by a peripheral edge that connects the head portion to a first side and a second side of the proximal straight section,

wherein the peripheral edge includes a first curved expanded section that connects the distal section to the first side of the proximal straight section and a second curved expanded section that connects the distal section to the second side of the proximal straight section,

wherein the first curved expanded section and the second curved expanded section are configured to accommodate a flared anatomy of a subtrochanteric region of a proximal femur.

17. The proximal femur bone plate as recited in claim 16, wherein the distal tip section is angled relative to the proximal straight section of the shaft portion.

18. The proximal femur bone plate as recited in claim 17, wherein the head portion is angled to the left or to the right relative to the proximal straight section of the shaft portion.

19. The proximal femur bone plate as recited in claim 16, wherein the distal section of the head portion is angled at an inclined angle relative to the proximal straight section of the shaft portion, and the proximal tip section is angled at a declined angle relative to the distal section.

20. The proximal femur bone plate as recited in claim 19, wherein the inclined angle and the declined angle are configured to accommodate a curvature of a greater trochanter of the proximal femur.

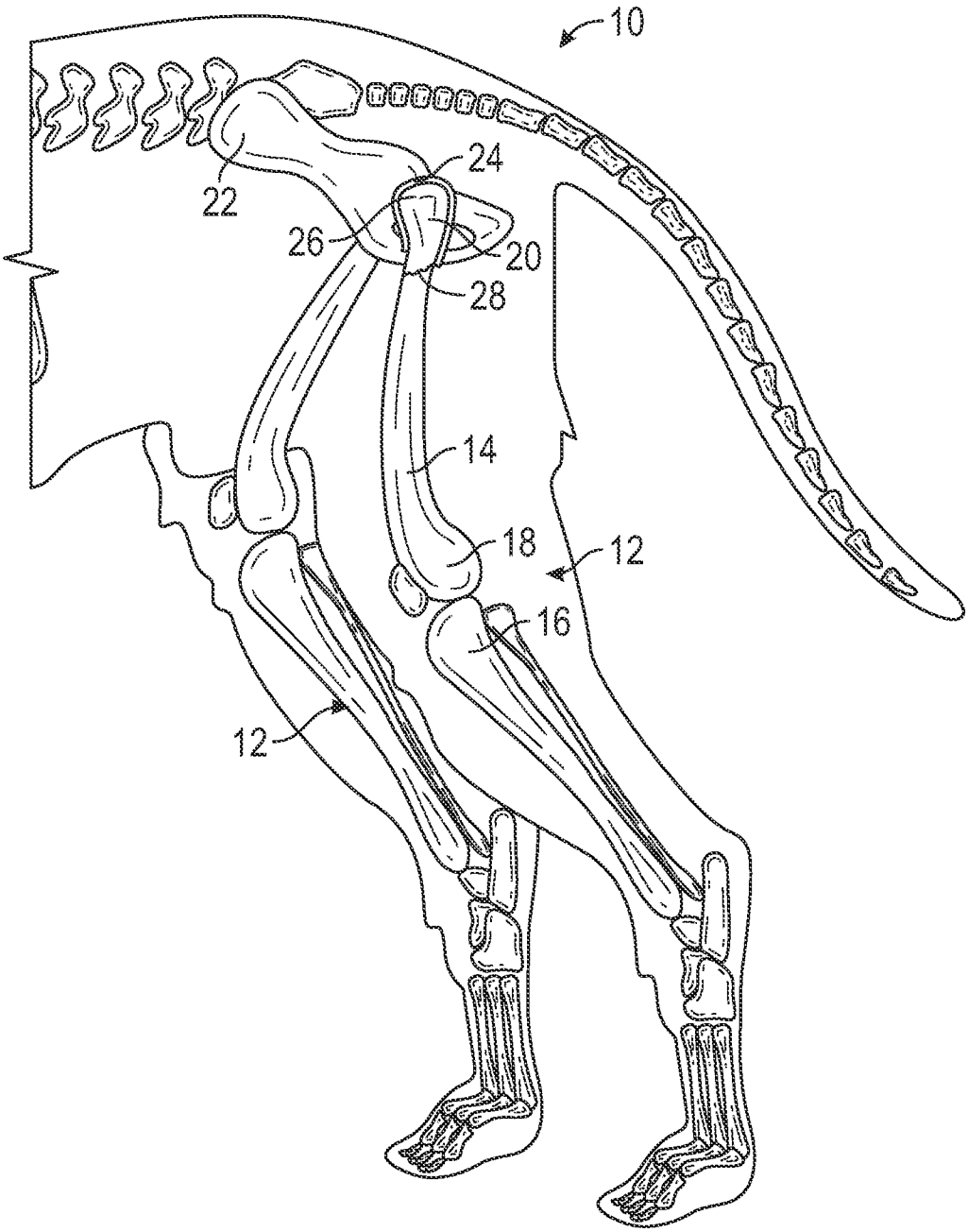

FIG. 1

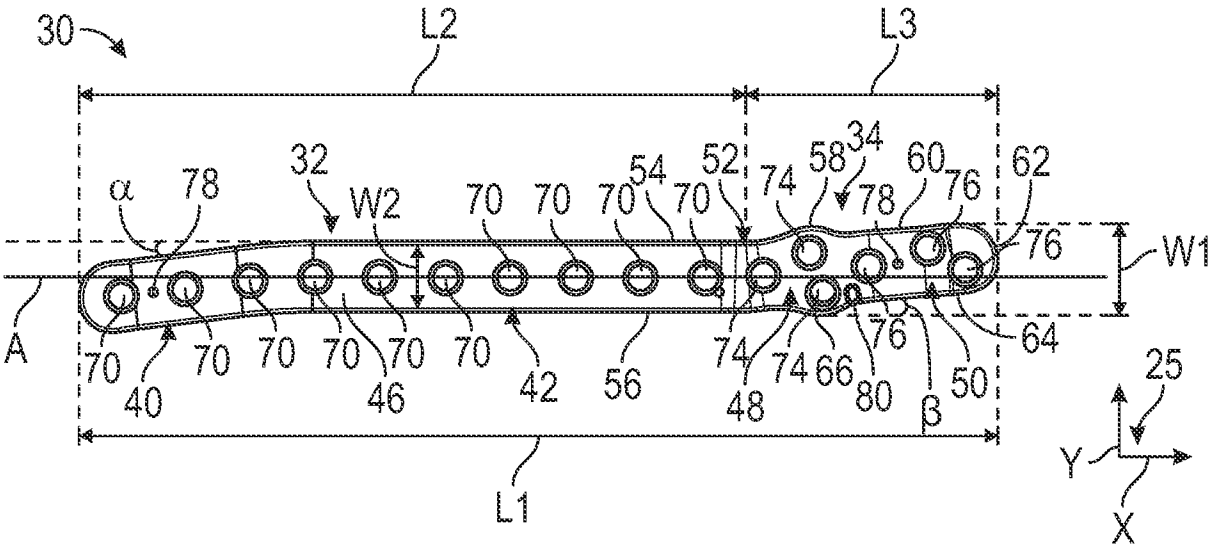

FIG. 2

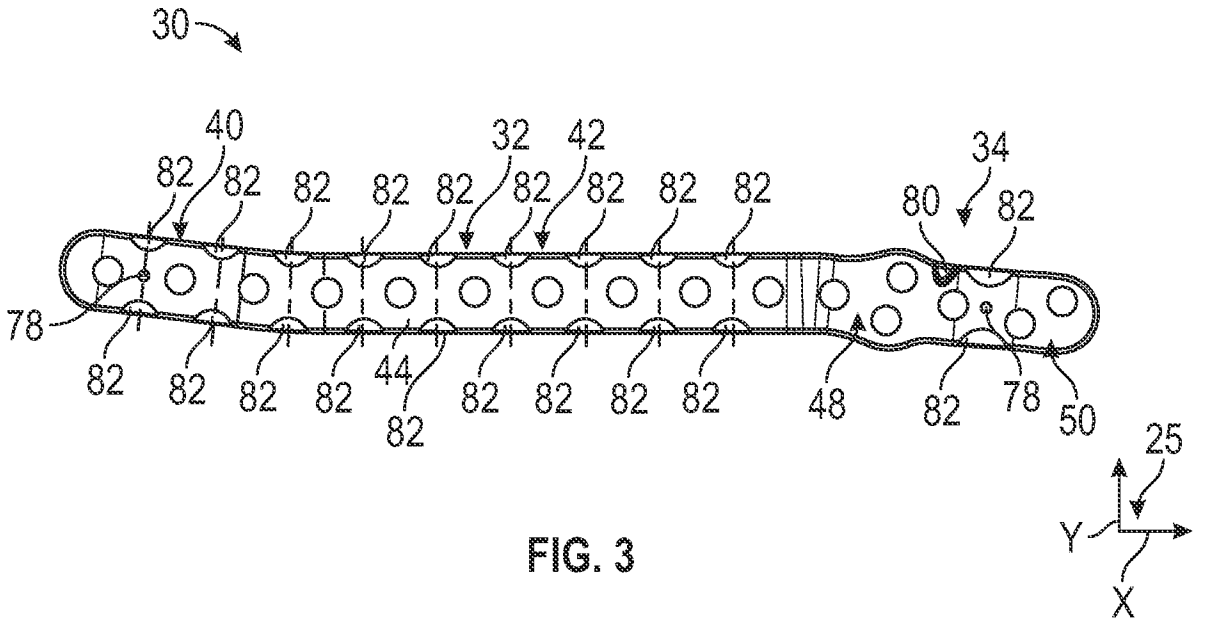

FIG. 3

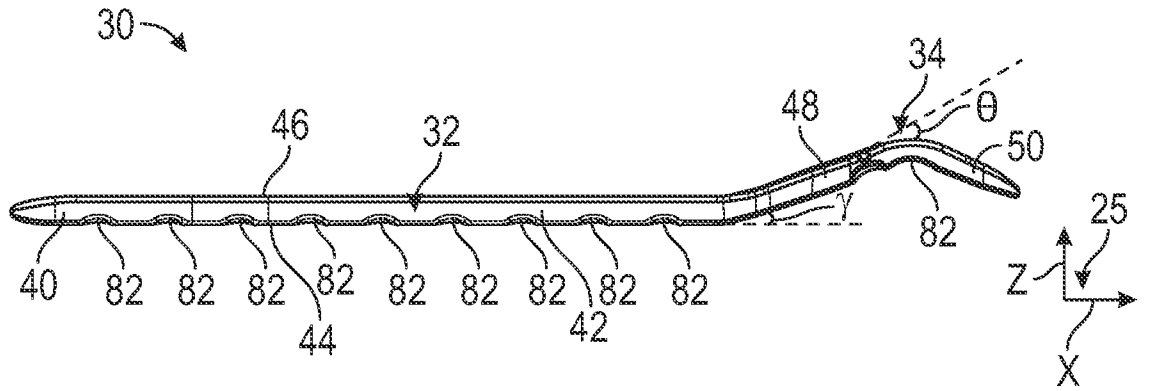

FIG. 4

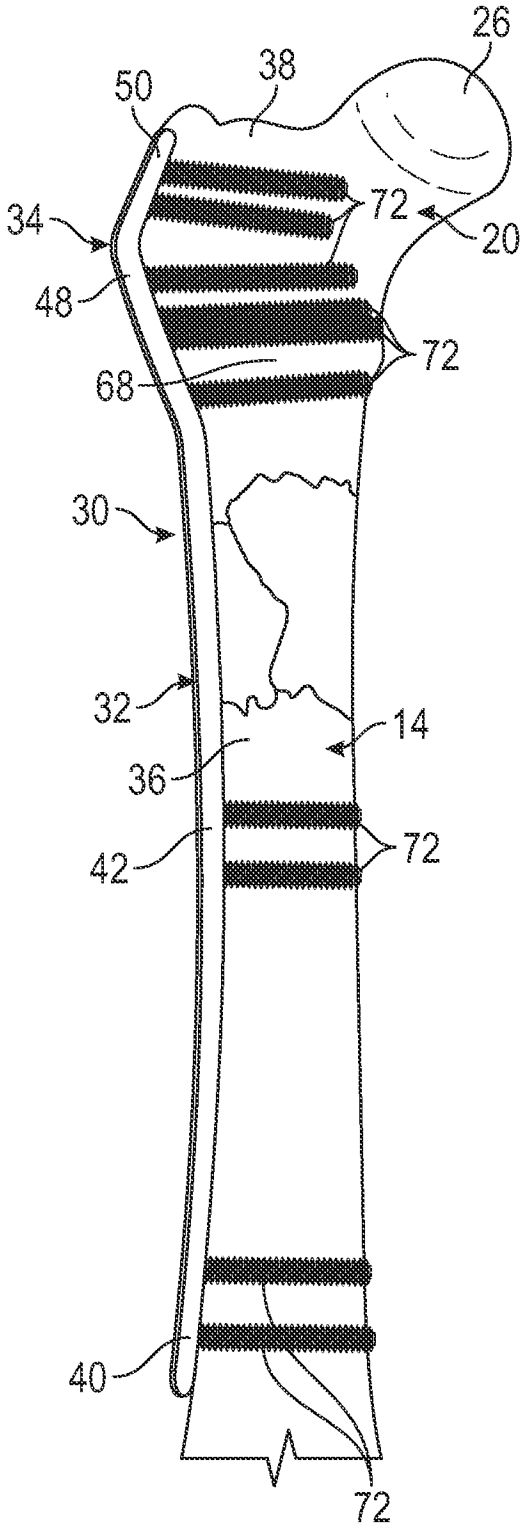

FIG. 5

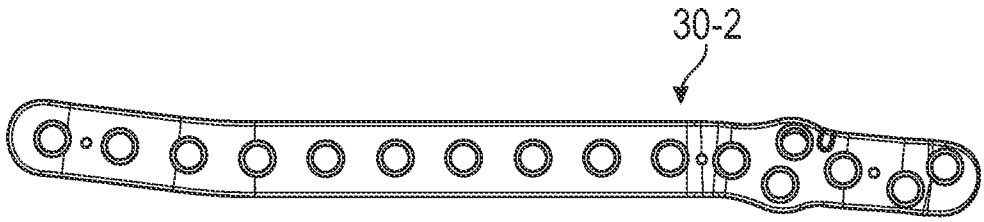

FIG. 6A

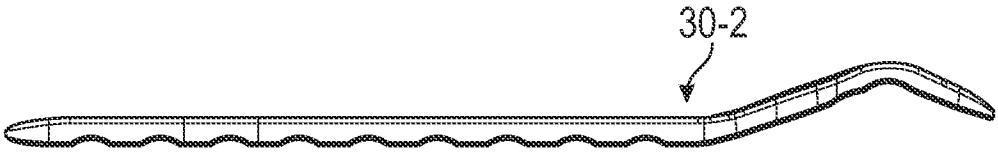

FIG. 6B

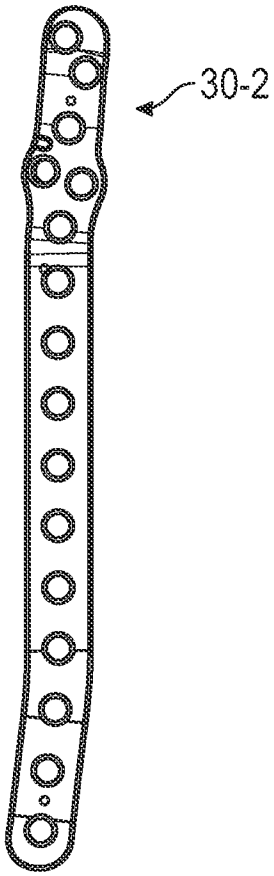

FIG. 6C

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/058603

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B17/74 A61B17/80
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2018/256221 A1 (KOAY KENNY [US] ET AL) 13 September 2018 (2018-09-13) paragraph [0012] - paragraph [0025]; figures 1-4	1-20
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A	column 2, line 32 - column 4, line 29; figures 1-5	4-11, 14-20
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A	column 3, paragraph 36 - column 4, paragraph 44; figures 3,5	3-20

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[x] Further documents are listed in the continuation of Box C.

[x] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 April 2025	15/04/2025

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Filali, Salima

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2024/058603

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 2019/380754 A1 (WIEDERKEHR ANDREAS [CH] ET AL) 19 December 2019 (2019-12-19) paragraph [0002] - paragraph [0027]; figures 1,2, 7	1-20

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