Nov. 19, 1935. J. R. MILLARD 2,021,566

APPARATUS FOR DEMONSTRATING SACRO-ILIAC LESIONS

Filed Jan. 9, 1934 3 Sheets-Sheet 1

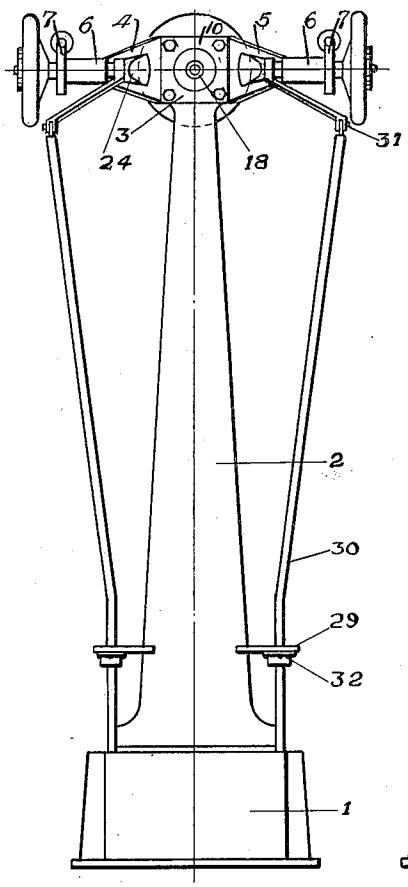


Fig. 1

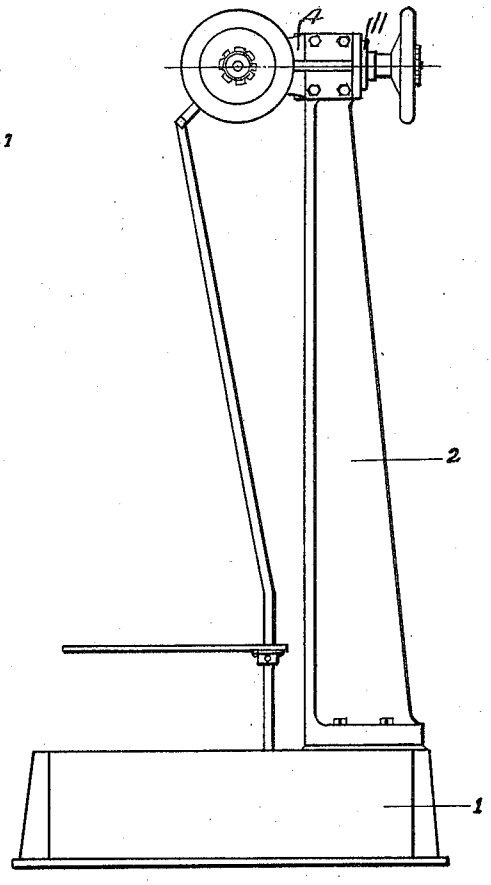


Fig. 2

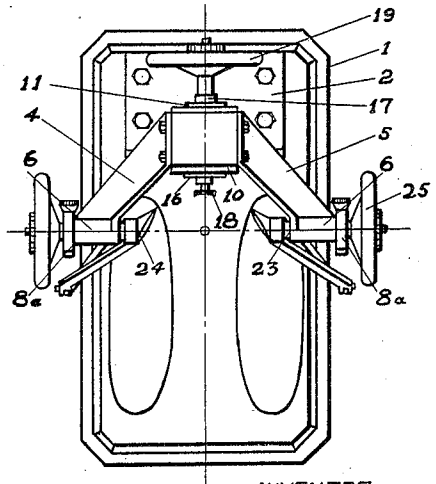


Fig. 3

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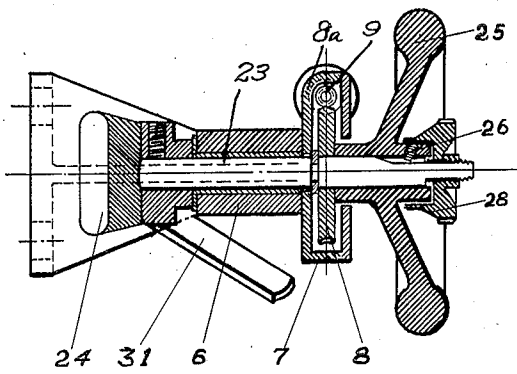


Fig. 4

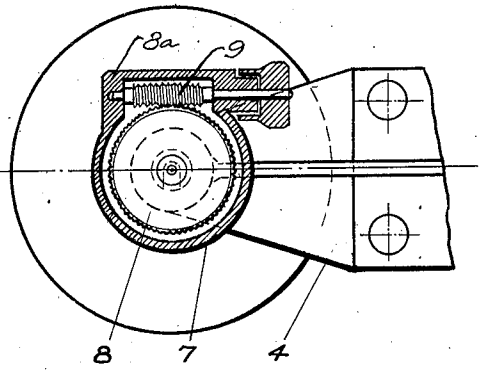


Fig. 5

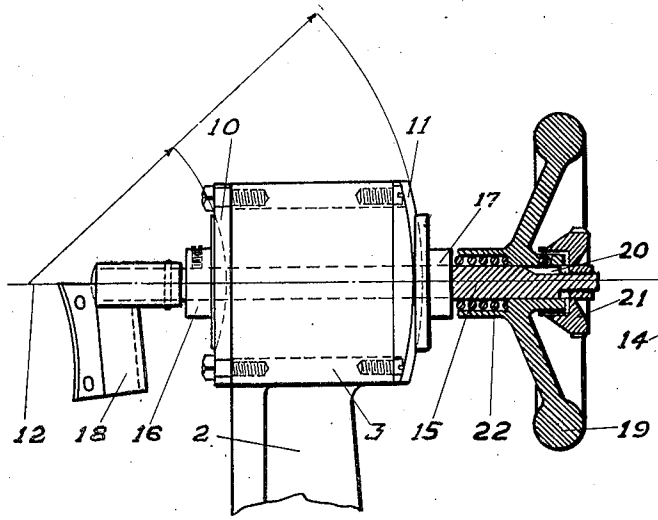


Fig. 6

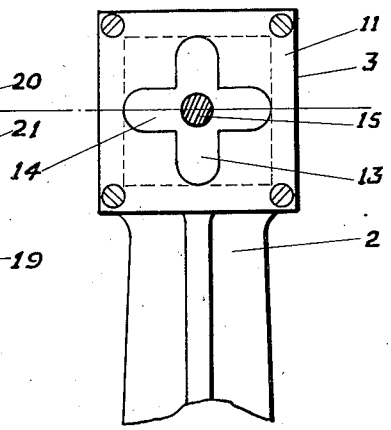


Fig. 7

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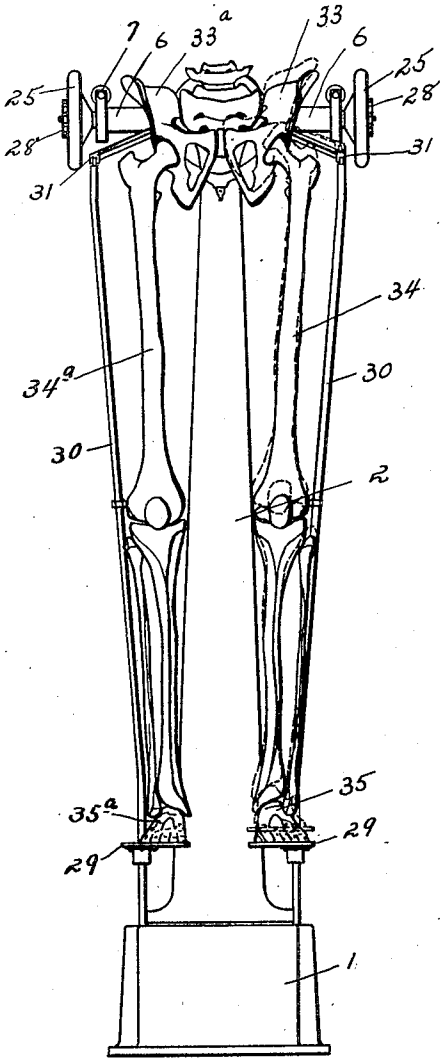


Fig. 8.

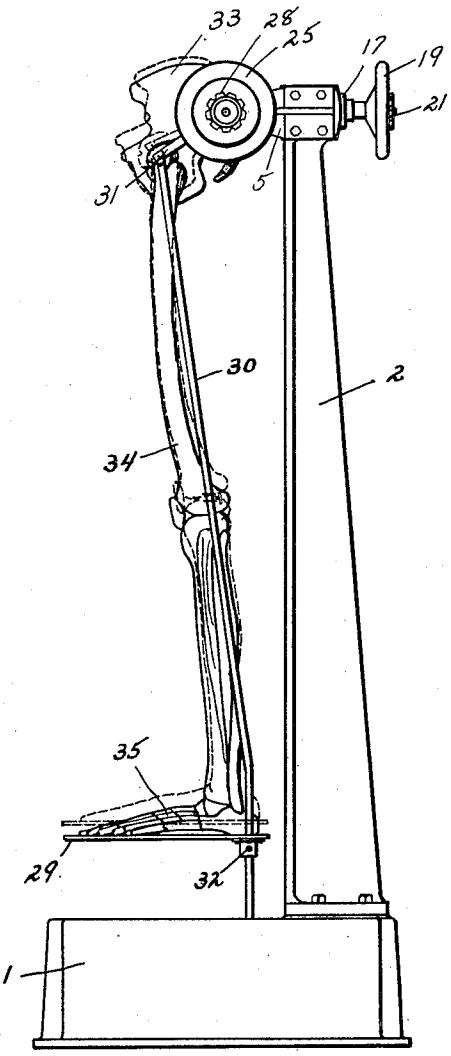


Fig. 9.

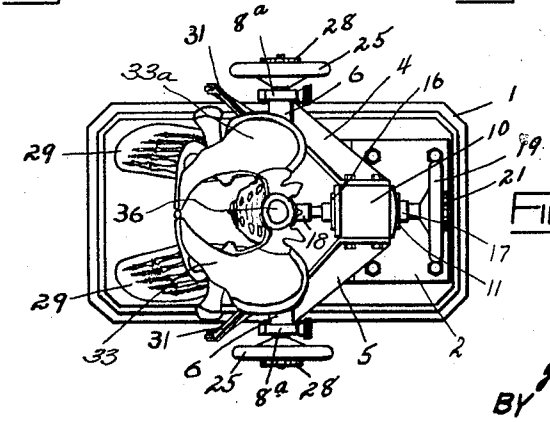


Fig. 10.

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Patented Nov. 19, 1935 2,021,566

UNITED STATES PATENT OFFICE

2,021,566

APPARATUS FOR DEMONSTRATING SACRO-ILIAC LESIONS

John Reesor Millard, Toronto, Ontario, Canada

Application January 9, 1934, Serial No. 705,941

5 Claims. (Cl. 35—17)

Heretofore, so far as I am aware, no apparatus has been designed for demonstrating dislocations of sacro-iliac joints to a patient in such a manner that the patient may obtain an actual picture of the nature, both quantitative and qualitative of the injuries in the sacro-iliac region. In order to do this it is necessary to provide a device which will move the sacrum in four different directions, that is, will rock it with a to and fro motion and also effect a slight rotation on its major axis. The device also must be provided with means for causing a rotation of the innominates or hip-bones at any desired degree.

The hip-bones and the sacrum are the real foundation for all the structure above and the legs and the feet are the supports. If a sacro-iliac strain, pelvic turn or wrench takes place, the bony framework of the ribs and chest and the spine from its base to the atlas will be thrown out of correct alignment. Even the head will not be on straight if one hip is tilted. Recent investigation has shown that many ailments are caused by displacements of the hip-bones and that these ailments can be corrected or alleviated by correcting the displacement. For instance arthritis is often caused by hip injuries that bring about flat feet and spinal curvature in the region of the kidneys. Sacro-iliac strains may be caused in various manners. Quite often a person may sustain such an injury in performing his daily duties or in sports. A slip on a wet floor or fall on the hip may disable a person for some time unless correction is made. A sacro-iliac strain may cause a curvature which may thrown the ribs and chest wall on the heart side and give the patient a heart-conscious feeling.

This invention relates to an apparatus which will effect the movement of the sacrum and the hip-bones into any of the possible positions so that displacements of the sacrum and hip-bones may be approximately demonstrated to a patient, thus making it possible to show him or her the nature of his or her injury in this locality. With this object in view I have designed an apparatus which will support that part of the human skeleton from the hip-bones to the feet and have provided it with means for effecting the necessary rotation of the hip-bones and the movement of the sacrum into the four different directions hereinbefore mentioned.

It is contemplated that the device will be operated by a physician, osteopath or some other person skilled in the art to which this invention relates. The skeleton which is used is preferably a prepared one, the bones of which are held together by artificial ligaments and cartilage.

In the following description I propose to describe a preferred embodiment of my invention having reference to the accompanying drawings in which:—

Fig. 1 is a front elevation of an apparatus constructed according to my invention;

Fig. 2 is a side elevation of the apparatus shown in Fig. 1;

Fig. 3 is a plan view of Fig. 1;

Fig. 4 is a sectional view of the means for rotating the hip-bones;

Fig. 5 is a sectional view on the line 5—5 Fig. 4;

Fig. 6 is a view partly in section of the means for effecting the movement of the sacrum;

Fig. 7 is a sectional view on the line 7—7 Fig. 1;

Fig. 8 is a front view of the device illustrated in Fig. 1 showing a skeleton mounted in position;

Fig. 9 is a side elevation of Fig. 8; and

Fig. 10 is a top plan view of Fig. 8.

Like characters of reference refer to like parts throughout the specification and drawings.

Referring first to Figs. 1, 2, and 3 the apparatus, which is shown completely assembled, consists of a base 1 on which is mounted a supporting member 2 and a housing 3 which may be formed with the supporting member or separately therefrom and mounted on the top of the supporting member in any convenient manner. Two arms 4 and 5 are secured to the housing and extend outwardly therefrom in a horizontal plane and at an angle thereto towards the front of the apparatus, the forward end of each arm being provided with a bearing 6 at right angles to a shaft which is mounted in the housing 3 to be hereinafter mentioned. The outer end of the casing of each of the bearings 6 is cast to form a housing 7 for enclosing a pinion 8. The operation and use of which will be described specifically with relation to the means for effecting the rotation of the hip-bones. The top of this housing 7 is provided with a bearing 8a in which is to be mounted a worm 9.

The means for effecting the movement of the sacrum is illustrated in detail in Figs. 6 and 7 and consists of the following parts which are movably supported by the housing 3. The front and rear end of the housing 3 is provided with plates 10, 11 respectively, the outer surface of this plate 10 having spherical faces with the point 12 shown in Fig. 6, as the center, and the plate 11 having a spherical convex surface with the point 12 as shown and also being provided with cross shaped slots 13, 14. The point 12

is located substantially in the center of the sacrum when it (the sacrum) is attached in position as hereinafter described. Mounted within the housing is a shaft **15** which is supported by collars **16**, **17**, contacting with the plates **10**, **11**, the contacting surfaces of the collars having spherical surfaces similar to the spherical faces of the plates so that they mate. The collar **16** is secured tightly on the shaft while the collar **17** is free to move in a longitudinal direction.

The shaft **15** extends beyond the collar **16** and has mounted thereon a member **18** which is shaped to fit the sacrum and is adapted to be secured thereto by means of screws or rivets. The rear end of the shaft extends beyond the collar **17** and has mounted thereon a wheel **19** which is keyed to the shaft against rotation on the shaft by a key **20**, this end of the shaft being screw threaded to receive a locknut **21** for clamping the shaft in any of its possible positions, this being accomplished by rotating the locknut to force the wheel against the collar **17**. The spherical faces of the plates and the collars are maintained in contact by a spring **22** which presses against the collar **17** and the wheel **19**.

The means for effecting the movement of each hip-bone is illustrated in detail in Figs. 4 and 5 and consists of a shaft **23** which is rotatably mounted in the bearing **6**. The inner end of the shaft being provided with a member **24** which has its outer surface shaped to fit the hip-bone. The outer end of the shaft has slidably mounted thereon a wheel **25** which is keyed thereto against rotation on the shaft by means of a key **26**. Mounted on the shaft within the housing **7** is a pinion **8** which meshes with the worm **9**. The outer extremity of the shaft is screw threaded and has threadably mounted thereon a locknut **28** by means of which the shaft **23** may be locked in its set position, the rotation of the shaft being effected either by the wheel **25** or if slow motion is desired by rotating the worm **9**.

In Figs. 8, 9, and 10 I have shown a skeleton mounted in position, the various parts of the skeleton being indicated by the following reference numerals, **33** indicates the left hip bone and **33a** indicates the right hip bone; **34** and **34a** the legs; **35** and **35a** the feet and **36** the sacrum. The member **18** is attached to the sacrum by means of screws or rivets while the members **24** are similarly attached to the hip bones. In Figs. 8 and 9 I have shown in dotted lines the hip bone **33** to illustrate a displacement of this hip bone. The displacement shown in dotted lines in Figs. 8 and 9 can be returned to normal position by manual manipulation by a skilled osteopath or others skilled in this art. The three hand wheels may be used simultaneously to show different dislocations which are in the right and left pelvic bones and the sacrum with respect to each but to have such a compound dislocation of the pelvic bones and sacrum would be rare and most unusual. The wheels **25** and **19** are never operated to force the bones together or apart.

Each leg of the skeleton is supported on a vertically movable platform **29** each platform being adjustably mounted on a vertically movable rod **30**. The lower end of each rod enters through an orifice in the base while the upper end is connected to a link **31** which is secured to and actuated by the member **24**. The platforms may be adjusted to the correct position by the set screw **32** so that when the skeleton is placed on the platforms the hip-bones will align with the members **24** and the sacrum with the member **18**.

In employing the demonstrator, the feet of the skeleton are placed on the platforms **29** with the hip-bones in line with the members **24**. The member **18** is secured to the sacrum by means of rivets or bolts and the members **24** pressed against the hip-bones. To rock the sacrum the nut **21** is loosened and the shaft **15** which slides in the slots **13**, **14**, is moved in a vertical plane with the point **12** as the pivot point which will give the sacrum a rocking movement. Since the shaft **15** moves on a circle with the point **12** as the center and since this point **12** is substantially in the center of the sacrum, the screws or rivets which connect the member **18** to the sacrum will not be loosened by this operation and when the sacrum is brought to the desired position it may be set by tightening the nut **21** which presses the collars **16** and **17** tightly against the plates **10**, **11**. To twist the sacrum from its normal position, the shaft is moved on a horizontal plane in the slot **14**. Each hip-bone may be rotated independently from its normal positions by the member **24**. For example the right hip-bone may be rotated from its normal position by loosening the nut **28** located on the right side of the device which permits the shaft **23** to be turned by the wheel **25** or the worm **9** which will cause the right hip-bone to be moved by the member **24** and may then be set in position to which it has been rotated by tightening the nut **28**. During the movement of the right hip-bone, any relative movement of the left hip-bone is prevented by member **24** on the left side of the device which is locked in position by its nut **28**. As the member **24** is rotated the platforms **29** are moved up and down to support the legs as they are moved by the movement of the hip-bones.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent is:

1. A device for supporting a skeleton and demonstrating therewith dislocations of sacroiliac joints comprising a base, a supporting member extending upwardly from the base, a housing mounted on the top of said member having incorporated therewith manually operable mechanical means engaging with the sacrum, movement of said means effecting a corresponding movement of the sacrum, and manually operable mechanical means engaging with each of the hip-bones for effecting a rotation of each hip-bone.

2. A device for supporting a skeleton and demonstrating therewith dislocations of sacroiliac joints comprising a base, a supporting member extending upwardly from the base, a housing mounted on the top of said member having incorporated therewith manually operable mechanical means engaging with the sacrum, movement of said means effecting a corresponding movement of the sacrum, and manually operable mechanical means engaging with each of the hip-bones for effecting a rotation of each hip-bone, and means movably supporting the legs attached to the hip-bones as they are raised and lowered by the rotation of the hip-bones.

3. A device for supporting a skeleton and demonstrating therewith dislocations of sacroiliac joints comprising a base, a supporting member extending upwardly from the base, a housing mounted on the top of said member having incorporated therewith manually operable mechanical means for moving the sacrum to various positions consisting of a shaft, one end of which is adapted for connection to the sacrum, said shaft

being mounted in the housing for movement in a horizontal and vertical direction on a center point located in the sacrum, and manually operable mechanical means engaging with each of the hip-bones for effecting a rotation of each hip-bone.

4. A device for supporting a skeleton and demonstrating therewith dislocations of sacroiliac joints comprising a base, a supporting member extending upwardly from the base, a housing mounted on the top of said member having incorporated therewith manually operable mechanical means for moving the sacrum to various positions consisting of a shaft, one end of which is adapted for connection to the sacrum said shaft being mounted in the housing for movement in a horizontal and vertical direction on a center point located in the sacrum, manually operable mechanical means for rotating each hip-bone consisting of a shaft rotatably supported by the housing, a member mounted on the inner end of each shaft shaped to fit and engage with the hip-bones, means for rotating said shaft to effect a movement of one of the hip-bones, means for locking said shaft in any of its possible positions; and means for movably supporting the legs attached to the hip-bones as they are raised and lowered, by the movement of the hip-bones consisting of a pair of adjustable and vertically movable platforms the movement of which is effected by the movement of the last mentioned member.

5. A device for supporting a skeleton and demonstrating therewith dislocations of sacroiliac joints comprising a base, a supporting member extending upwardly from the base, a housing mounted on the top of said member having incorporated therewith manually operable mechanical means for moving the sacrum to various positions consisting of a shaft, one end of which is adapted for connection to the sacrum, said shaft being mounted in the housing for movement in a horizontal and vertical direction on a center point located in the sacrum, the mounting for said shaft consisting of a pair of plates, one secured at each end of said housing the outer surface of each plate having a spherical face concentric with the said center point, two collars mounted on said shaft having spherical surfaces mating with the surfaces of said plates, manually operable mechanical means for rotating each hip-bone consisting of a shaft rotatably supported by the housing, a member mounted on the inner end of each shaft shaped to fit and engage with one of the hip-bones, means for rotating said shaft to effect a movement of one of the hip-bones means for locking said shaft in any of its possible positions; and means for movably supporting the legs attached to the hip-bones as they are raised and lowered by the movement of the hip-bones consisting of a pair of adjustable and vertically movable platforms the movement of which is effected by the movement of the last mentioned member.

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