

951,274.

L. J. GRONDE.
ADJUSTABLE BED.
APPLICATION FILED SEPT. 23, 1908.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

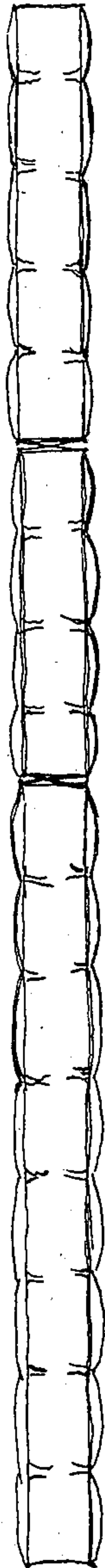
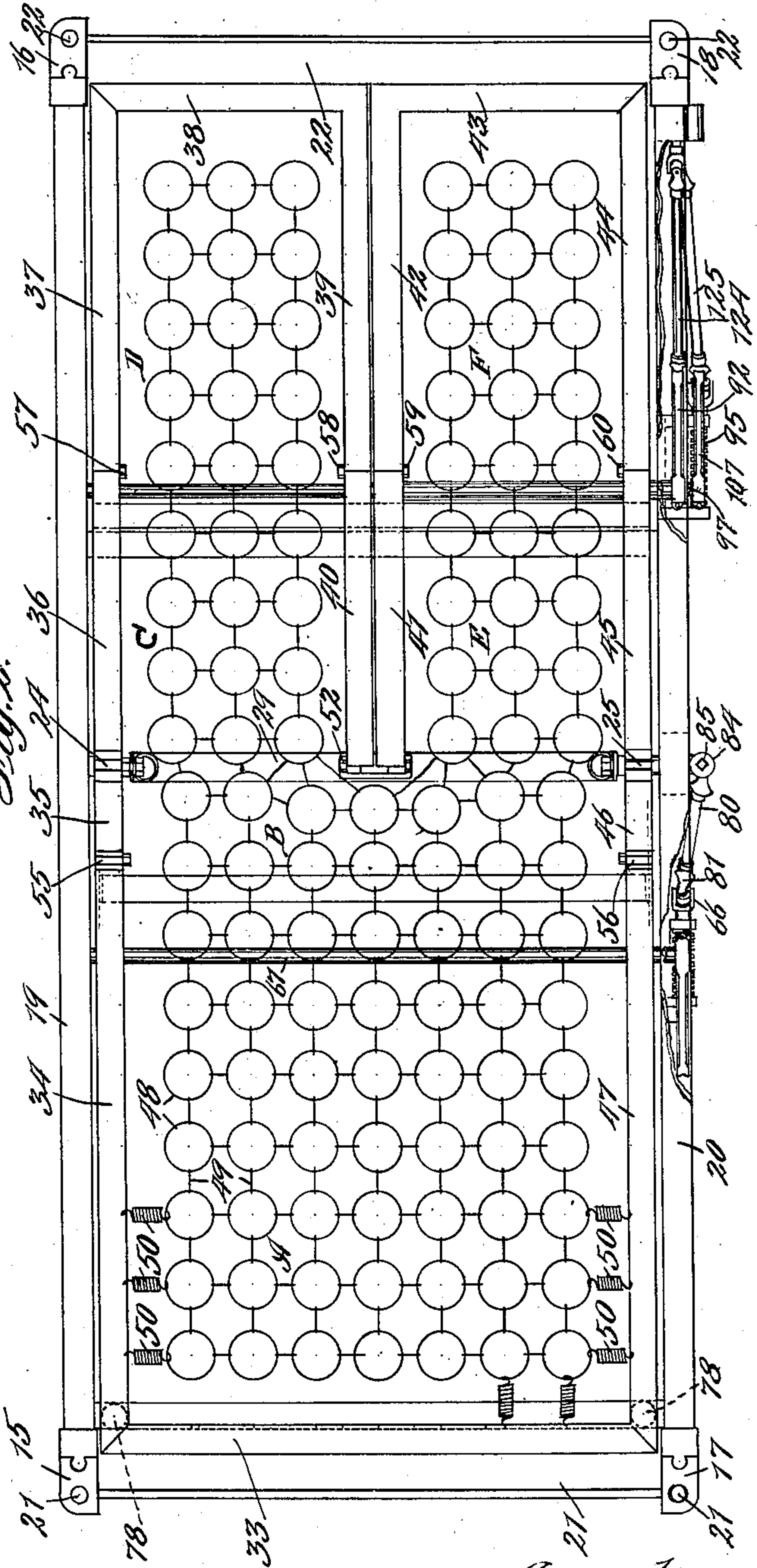


Fig. 2.



Witnesses:

Edw. D. Perry
John H. Nelson, Jr.

Inventor:

Louis J. Gronde
By Cheever & Cox

Atty.

L. J. GRONDE.

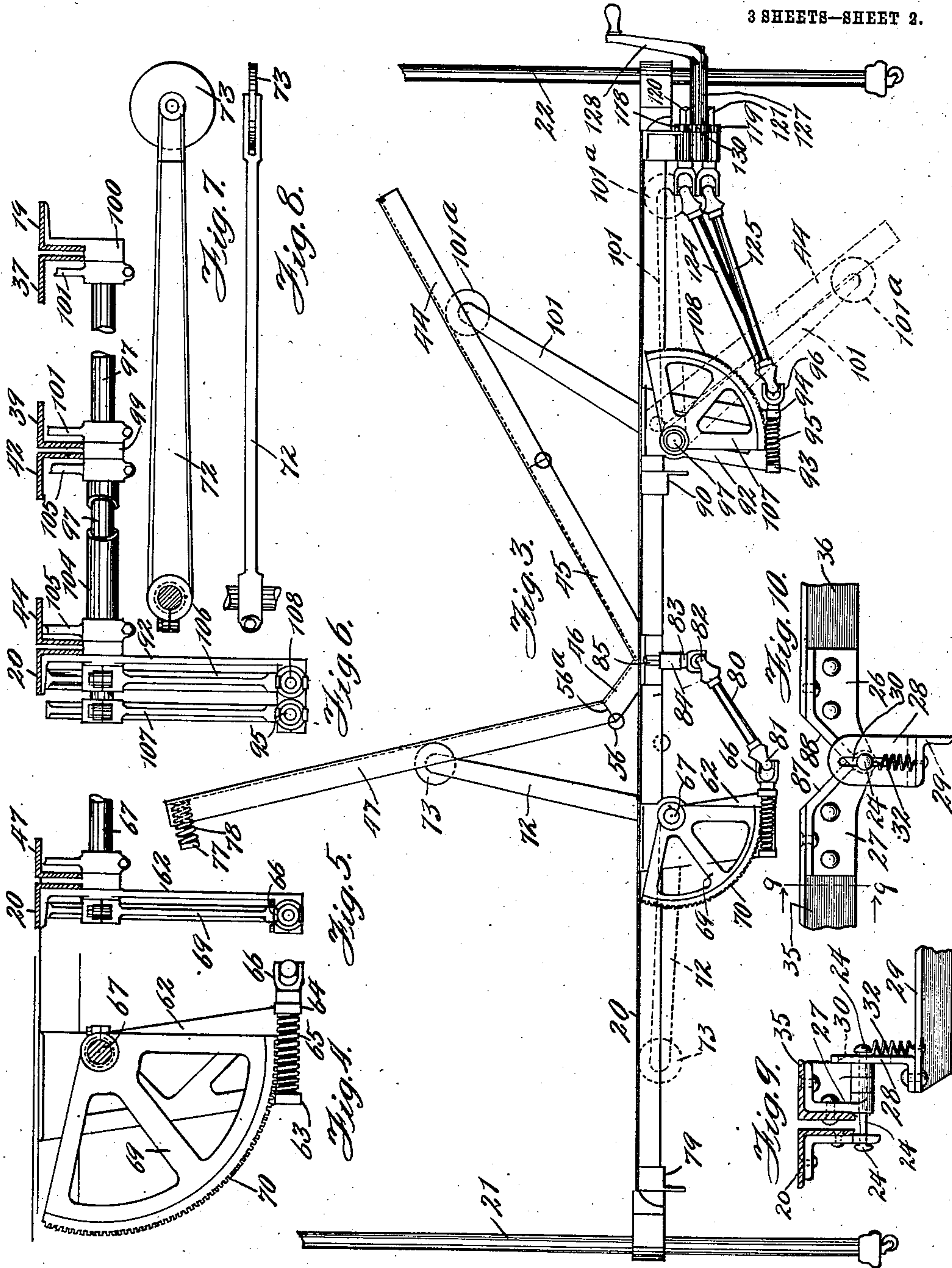
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John Meloy, Jr.

Inventor:

Louis J. Gronde

By *Cheever & Co.*

Atty.

L. J. GRONDE.

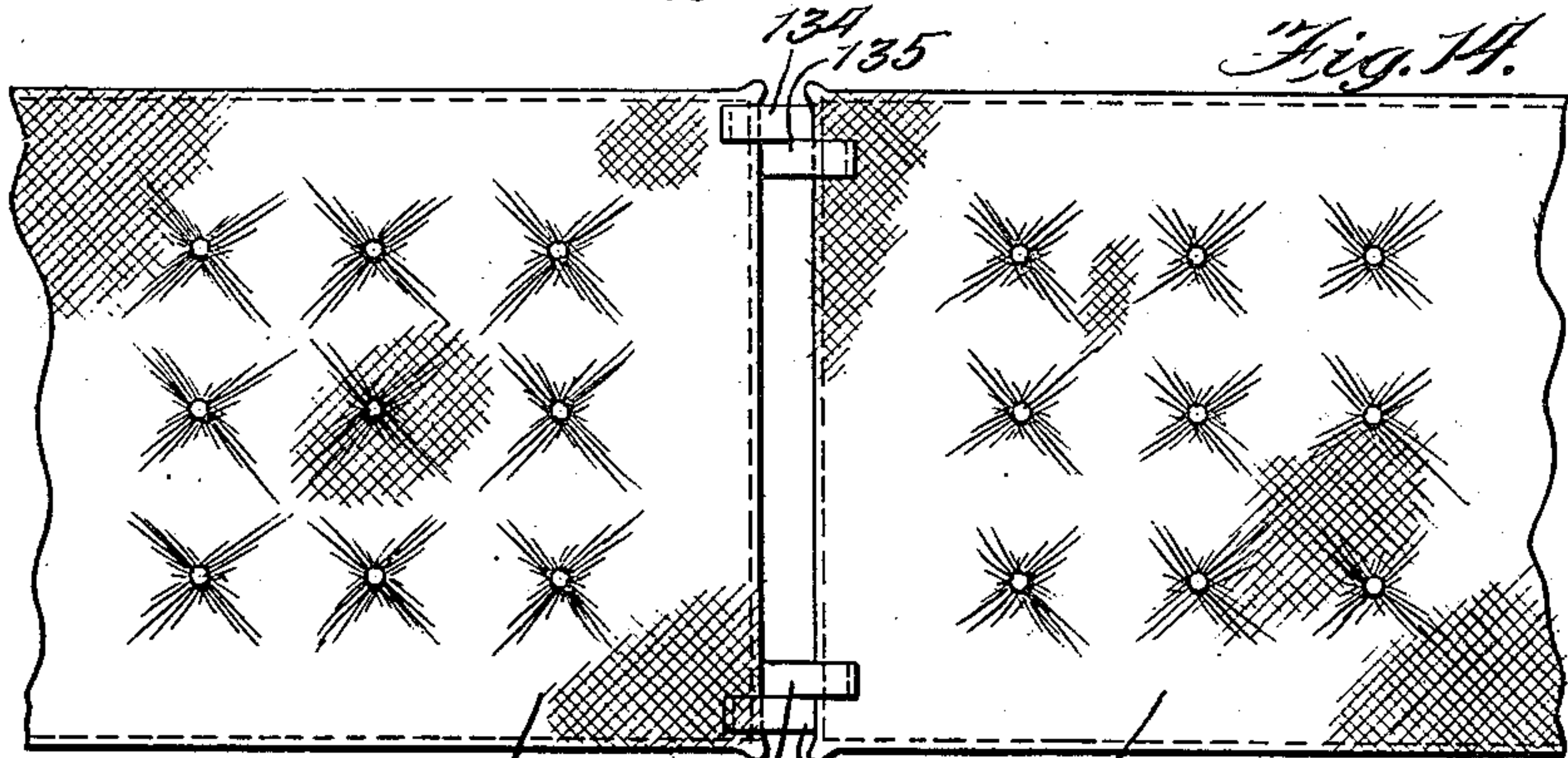
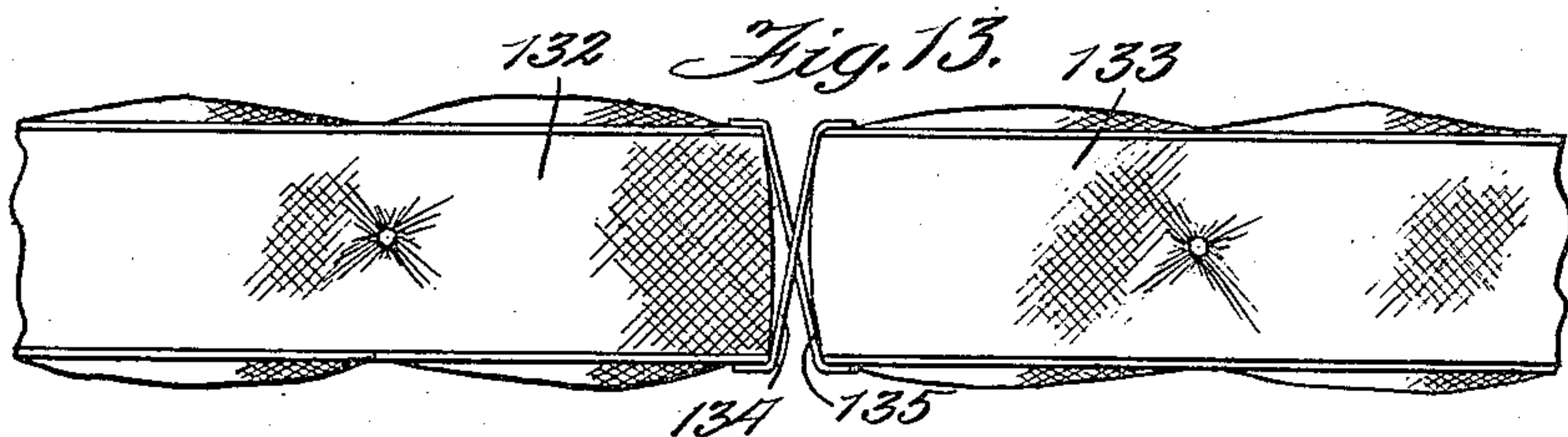
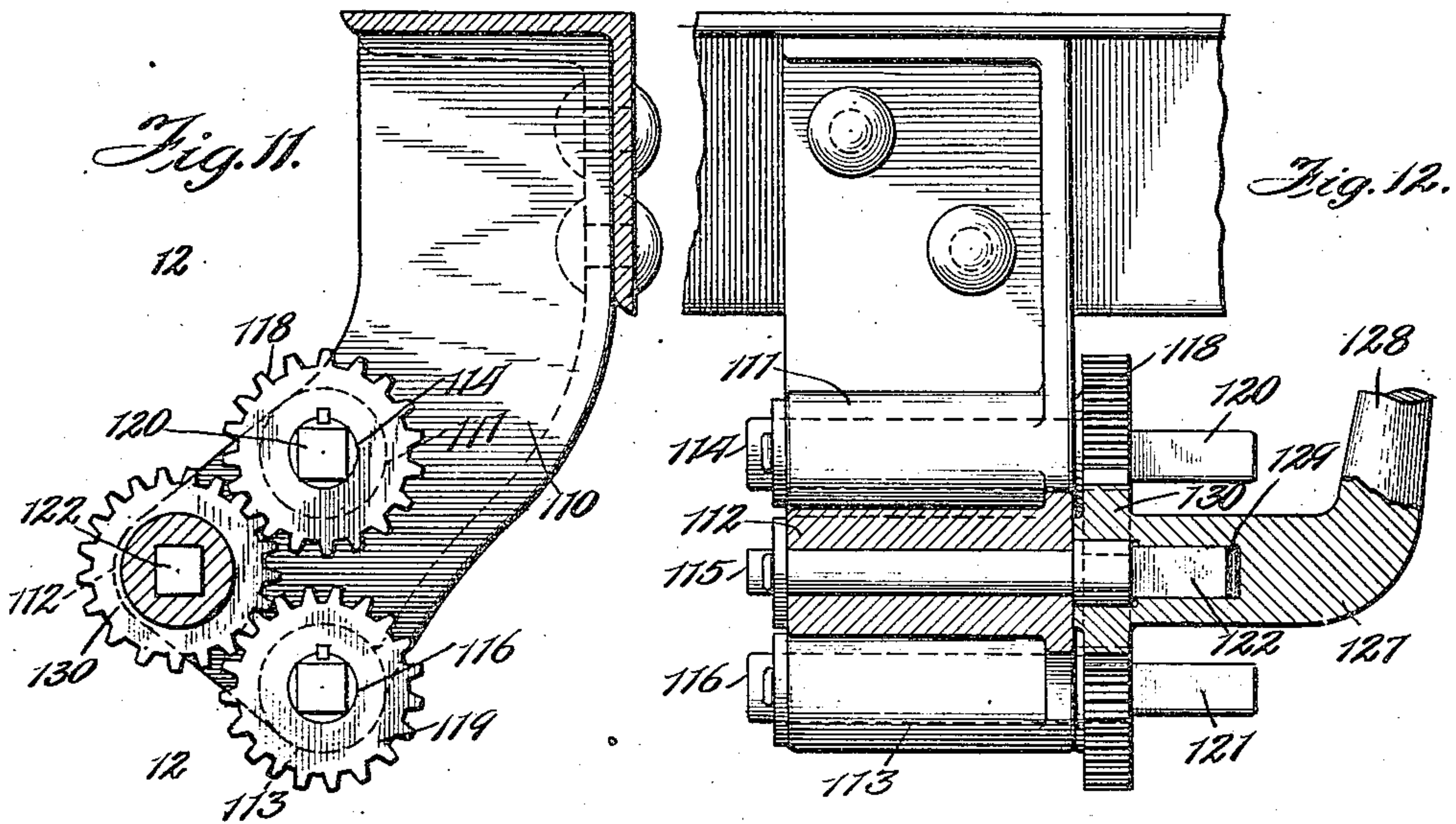
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3 SHEETS—SHEET 3.



Witnesses:

W. D. Perry
Wm. H. Wilson Jr.

Inventor:

Louis J. Gronde
By Cheever & Cox

Atty.

UNITED STATES PATENT OFFICE.

LOUIS J. GRONDE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO PHILIP J. SIEBOLD, OF CHICAGO, ILLINOIS.

ADJUSTABLE BED.

951,274.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed September 23, 1908. Serial No. 454,437.

To all whom it may concern:

Be it known that I, LOUIS J. GRONDE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Adjustable Beds, of which the following is a specification.

This invention relates to adjustable beds and its object is to provide a bed for use in hospitals and other places where invalids are being taken care of, in which different portions of the bed may be mechanically elevated or depressed as desired so that the invalid occupying it may, with comfort sit up, in a more or less upright position, as desired.

The invention consists in mechanism by means of which the springs are hinged in the middle of the bed and either portion may be raised at the will of the operator to an inclined position so as to support the patient occupying the bed in sitting or semi sitting position.

The invention also consists in means by means of which one half of the bed proper is divided and either quarter of the bed may be separately elevated or the two parts may be jointly elevated and depressed as described.

The invention more in detail consists in novel mechanism for spring supporting different parts of the device and in other details of construction which will be hereafter described.

Incidental to the foregoing the invention consists in a novel form of mattress capable of being used in connection with the foregoing devices in such a way that it does not interfere with the tilting of the various parts of the bed.

Referring to the drawings in which similar characters indicate the same parts throughout the several views, Figure 1 is a side view of a mattress designed to be used upon the bed mechanism proper which is shown in plan view in Fig. 2. Fig. 3 is a side view of a bed corresponding to Fig. 2 illustrating the mechanism of this invention applied thereto. Fig. 4 is a side and Fig. 5 an end detail view of the lifting mechanism for the head end of the bed. Fig. 6 is an end detail view of the lifting mechanism for the foot end of the bed. Figs. 7 and 8 are views in two different directions of the lever and roller mechanism used in connection

with said lifting mechanisms. Fig. 9 is a sectional detail view on line 9—9 Fig. 10. Fig. 10 is an enlarged detail view taken just inside the members 35 and 36 as viewed in Fig. 2 and looking toward the outside of the bed. Fig. 11 is an end and Fig. 12 a side detail view of the crank mechanism for the foot end of the bed. Fig. 13 is a side and Fig. 14 a plan detail view of two sections of the mattress showing the means by which they are so connected that it may conform to the bends and joints produced in the bed when its different portions are elevated and depressed in the manner hereafter described.

Referring again to the drawings and particularly to Fig. 2 the reader will observe four corner posts 15, 16, 17 and 18 of an ordinary bed preferably of metal construction having the side boards or rails 19 and 20 the head board 21 and the foot board 22. These are here shown in the ordinary iron or brass bedstead form but they are made in any of the common and well known forms. Rigidly secured to the side rail 19 is a stud 24 extending inwardly toward the center of the bed and in line with this stud and correspondingly mounted upon side rail 20 is another stud 25. Hinged upon each of these studs 24 and 25 are hinge leaves 26 and 27 of a hinge. Each of these hinges is as shown adjacent to the side rails 19 or 20 as the case may be. Inside of each of these hinges and slidably mounted upon each stud 24 and 25 is an upright plate member 28 to which is riveted one end of a suspension angle bar or iron 29 extending across the bed as best seen in Fig. 10. The studs 24 and 25 pass through elongated slots 30 in the upright members 28 and the upright members with the bar 29 are therefore movable upward and downward through a distance equal to the lengths of the slots. This bar 29 is normally held in raised position by springs 32 best seen in Figs. 7 and 8 so that when a load is put upon the bar 29 that load is suspended upon said springs 32, the bar 29 being as stated free to move upward and downward under the action of a load placed upon it and against the resistance of the springs 32.

As heretofore stated the object of this invention is to provide a bed mechanism by which different portions of the supporting mechanism of the bed proper may be elevated and depressed. Broadly stated this is

accomplished by making the bed proper in three parts one half for the body and one quarter for each lower limb of the occupant; hinging the two latter to the former and providing an elevating mechanism for each part. As the comfort of the user is to be considered it is highly desirable that the whole be spring equipped though manifestly broadly stated the springs may be omitted without departing from the main invention.

The preferred form of mechanism illustrating not only the broad invention but the details will now be described. The outer frame or border of the springs of the bed in question consists of the members 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46 and 47, having interconnected between them wire circular members 48, connecting wires 49 and springs 50. The members 35 and 46 are respectively connected to the leaves 27 of the hinges heretofore described mounted upon the adjacent studs 24 and 25. The members 36 and 45 are respectively connected to corresponding members 26 of said hinges and the members 40 and 41 are independently connected to a hinge mechanism 52 suspended upon bar 29 in any suitable manner. The result of this construction just described is that in effect the spring of the bed proper is divided into two parts hinged along the central transverse axis of the bed so that the head portion hereafter for convenience, referred to as section A—B may be tilted upward on the hinge pivots 24 and 25 and that the other half of the spring proper of the bed is divided into halves of itself or quarters of the whole bed hereafter referred to as sections C—D and E—F so that either portion designed to be normally occupied by the limb of a person may be tilted upward as shown.

For convenience in making the head portion fit the back of an invalid in semi sitting position the members 34 and 35 are hinged together at 55 and the members 46 and 47 are hinged together in a parallel hinge 56 thereby dividing this section into the parts A and B. It will be noticed that the amount of movement of the parts A and B with reference to each other is limited by the inclined faces 56^a. For the purpose of allowing the foot supporting portions D and F of the limb supporting portions C—D and E—F to drop down so that the occupant's feet may rest approximately on a level with the floor the members 36 and 37 are hinged to 57; the members 39 and 40 are hinged together at 58; the members 41 and 42 are hinged at 59 and the members 44 and 45 are hinged together at 60. The hinges 57, 58, 59 and 60 are upon the opposite side of the spring bed frame from the hinges 55 and 56 so that section A bends with reference to section B, in the reverse direction

from that in which section D bends with reference to section C and section F bends with reference to section E.

It will be seen that by the construction above described the spring mechanism 48—49—50 runs from the body section A—B down each of the lower limb sections C—D and E—F without any interruption so that each portion of the occupant's whole body is spring supported. It will also be noticed that the springs 32 support the metal members 39—40—41—42 so that their presence is unobjectionable to the occupant of the bed should he accidentally come in contact more or less directly with them.

Rigidly connected to the side rail or frame 20 of the bed and adjacent to sections A and B of the spring bed proper is a depending bracket 62 having journal bearings 63 and 64 in its lower portion for a worm 65 carrying at its one outer end a U shaped yoke 66. In or on the upper portion of this bracket 62 is journaled one end of the shaft 67 extending across the bed, the opposite end thereof being journaled in a suitable casting corresponding to the casting 62, but not here shown, secured to the under side of the side rail 19. Rigidly connected to this shaft 67 and in the same plane as the worm 65 is a segmental gear 69 having upon its face worm teeth 70 meshing with the worm 65. Rigidly connected to the shaft 67 and just inside the vertical flange of the member 47 is a lever 72 carrying on its opposite end a roller 73 adapted to travel upon the under side of the horizontal flange of the member 47. Similarly mounted upon the opposite end of the shaft 67 and adjacent to the member 34 heretofore described is a duplicate lever 72 and wheel 73 (not shown) bearing upon the under side of the horizontal flange of the member 34. The result of the foregoing construction is that when the worm 65 is rotated in one direction sections A and B of the bed are moved by the levers 72 and the rollers 73 to the vertical or full line position shown in Fig. 3 and when the worm is rotated in the opposite direction the levers 72 are moved to the dotted line position in Fig. 3 with the result that the relatively heavy parts constituting sections A and B of the bed descend of their own weight until the blocks 77 upon the lower ends of the springs 78 attached, as shown to the extreme end portions of section A of the bed, rest upon the horizontal angle iron 79 secured across the extreme end of the bed as shown. In other words by rotating the worm 65 in either direction sections A and B of the bed may be moved from horizontal to inclined position or back again as desired.

Any suitable mechanism may be provided for rotating the worm 65, a convenient form, here shown, being a rod 80, having one end connected by a universal joint 81 to the yoke 130

66 heretofore described the other end connected by universal joint 82 to an upright shaft 83 journaled in a suitable bearing 84, the upper end of the shaft 83 having a non circular portion 85 to which any suitable wrench may be applied to rotate the shaft 83 and consequently the worm.

In view of the well known friction existing in worm mechanisms it is manifest that sections A and B of the bed are locked in any position in which the worm mechanism may be left standing supporting them.

A too high elevation of the parts of the bed just described is guarded against by the angularity of the faces 87 and 88 of the leaves of the hinges 27—26 heretofore described, it being manifest that when the elevating mechanism just described moves the portions of sections A and B of the bed member 87 carrying those sections of the bed until the faces 87 of the hinge leaves 27 engage the faces 88 of the adjacent leaves 26 no further elevation of the sections A and B can be made without breaking something. This feature prevents injury to the patient by too high elevation of any one of the movable parts.

Across the under side of the bed frame proper is rigidly secured an angle iron 90 adjacent to the ends of the members 45, 41, 40 and 36 and the hinges 57, 58, 59 and 60 said angle iron being adapted to support said portions of the side members of sections E and C of the bed when they are in horizontal position from which it follows that these sections of the bed like section A and B of the bed can be elevated from horizontal position but can not be depressed below said position.

Rigidly connected to the side member 20 of the bed proper and preferably nearer the end thereof than the bar 90 just described is a depending bracket 92 carrying at its lower end suitable bearings 93 and 94 in which a worm 95 corresponding closely to the worm 65 heretofore described is mounted. The outer end of this worm 95 carries a yoke shaped member 96 corresponding to the yoke 66. Journaled in the upper portion of this bracket 92 within a sleeve 104 hereafter described is a shaft 97 extending across the bed parallel to the shaft 67. This shaft is journaled at the middle line of the bed in the members 99 and 100 best seen in Fig. 6. Rigidly secured to the shaft 97 and in the same planes as the members 37 and 39 are lever arms 101 identical with lever 72 carrying at their outer end rollers 101^a like rollers 73 which rollers bear against the under sides of the members 37 and 39. Inclosing that portion of the shaft 97 which is between the members 42 and 44 of section F of the bed is a sleeve 104 carrying lever arms 105 which in turn carry rollers 101^a identical with rollers 73 bearing against the under sides

of the members 42 and 44. This sleeve extends around the shaft 97 and through the casting or bracket 92 as best seen in Fig. 4. On this projecting end of the sleeve 104 is rigidly secured a segmental gear 106 identical with and parallel to a segmental gear 107 upon the extreme end of the shaft 97. This segmental gear 107 carries worm teeth 108 meshing with the worm 95 heretofore described. The segmental gear 106 has identical worm teeth meshing with a worm 108 parallel to the worm 95 heretofore described. The worms 95 and 108 are as shown parallel to each other in a horizontal plane.

From the foregoing it will readily be seen that rotating the worm 95 in one direction will cause the shaft 97 to move the arms 101 to lift sections C and D of the bed to the elevated position shown in Fig. 3 and that rotating said worm in the opposite direction will move the arms 101 and attached rollers to a depressed position shown in dotted lines in which section D may rotate about the hinge 57 and move downward to the depressed position shown. Similarly rotating the worm 108 will through the rotation of the sleeve 105 correspondingly manipulate sections E and F of the bed.

Any suitable mechanism may be used for rotating these worms but for convenience it is desirable to provide a mechanism adjacent to the end of the bed by means of which the operator may rotate either worm as desired by which a single mechanism such as a crank handle may rotate both worms simultaneously. In order to accomplish this purpose there is rigidly attached to the side member 20 of the bed by any suitable means a depending bracket 110 carrying suitable bearings 111, 112 and 113 in which are respectively journaled short shafts 114, 115 and 116. The shafts 114 and 116 carry pinions 118 and 119 not in mesh with each other and non circular projecting stems 120 and 121 to which a wrench may be attached. The shaft 115 carries no pinion but does have a non circular stem 122. The shaft 114 is connected by a rod 124 and universal joints corresponding to those heretofore described to a worm 108. Shaft 116 is connected by a rod 125 and similar universal joints to the worm 95. A wrench 127 having a handle 128 is provided, the wrench having a non circular hole 129 corresponding to the shapes of the stems 120, 121 and 122 heretofore described. This wrench also carries a pinion 130 so shaped and toothed that when the wrench is upon the stem 122 in the manner shown in Fig. 10 it meshes with the pinions 118 and 119 and rotating the crank will therefore rotate through the mechanisms described both the sleeve 104 and the shaft 97 in the same direction. When the wrench with the attached pinion 130 is removed from the stem 122 and placed on

either stem 120 or 121 as desired the mechanism attached to the stem thus engaged by the wrench will be rotated by the wrench while the other stem and attached parts remain at rest. The result of this is that the operator may at will elevate either of the foot sections of the bed independently or simultaneously as desired.

As an ordinary stiff mattress could not be readily used upon a bed of this character in which the two halves of the bed are capable of elevation through an angle of about 90 degrees it is necessary to provide a mattress which is jointed, the joints corresponding to the hinge joints heretofore described. In order to accomplish this purpose the mattress shown in Figs. 1, 10 and 11 has been devised the same consisting of sections 132 and 133 joined together at suitable intervals by straps 134 and 135 the opposite ends of these straps being connected as shown to opposite sides of the mattress section with the result that a free and easily bendable joint is formed allowing the mattress to accommodate itself easily to any position desired.

For convenience of description and reference thereto in the claims it should be noted that the edges of the tiltable frame sections are U shaped and are connected to the respective hinges at their ends.

In general operation of the device the bed shown is equipped with a mattress conforming to the various movable sections. The patient lies thereon with his body and head on sections A—B and his lower limbs on sections C—D and E—F respectively. By manipulating the various tilting mechanisms the operator can place the patient in any desired position.

What I claim as new and desire to secure by Letters Patent, is:

1. A bed of the class described compris-

ing a body supporting portion and two limb supporting portions adjacent to each other, hinge connections between each of the latter mentioned portions and the body portion, tilting means for each of the limb supporting mechanisms and an operating member detachably connected to each of said operating mechanisms adapted to move the limb supporting portions of the device in unison.

2. In mechanism of the class described the combination of a bed spring mechanism capable of supporting a person, divided transversely along approximately the transverse middle line into two parts one of said parts being also divided along approximately the longitudinal middle line of the bed into two other parts, mechanism for independently hinging each of the last mentioned parts to the remaining half of the bed and operating mechanism attached to each of the three parts of the spring mechanism capable when operated of changing the angular position of that part of the spring mechanism with reference to the other parts thereof and an operating mechanism detachably connected to two of the first mentioned operating mechanisms for moving them in unison.

3. In a device of the class described a bed frame proper, a bar across the bed, means connecting the ends of the bar to the sides of the bed in such a way that the bar may move up and down with reference to the bed frame and spring mechanism normally holding said bar in elevated position for the purposes set forth.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

LOUIS J. GRONDE.

Witnesses:

DWIGHT B. CHEEVER,
C. J. CHRISTOFFEL.