

Aug. 6, 1929.

W. F. MacFEE

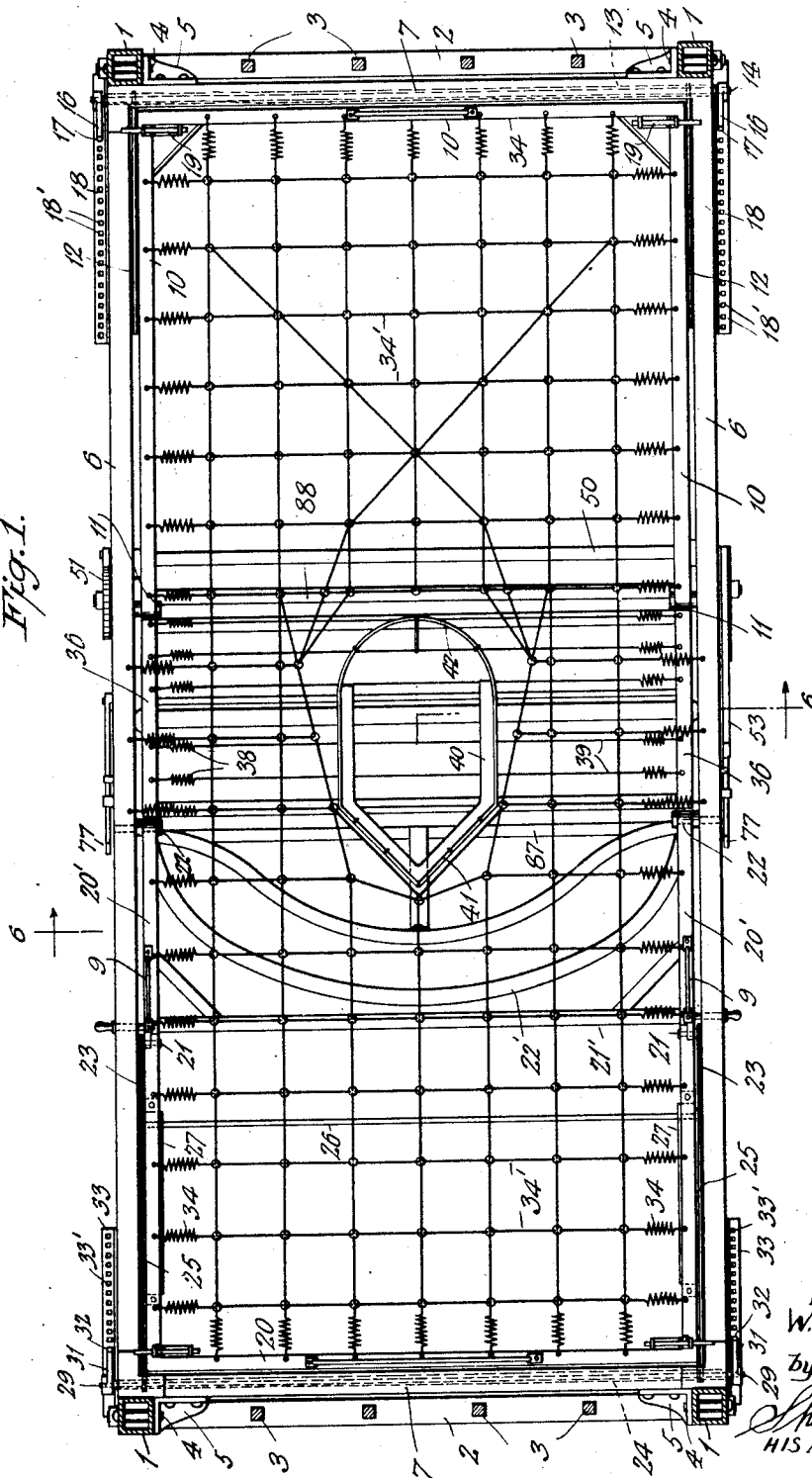
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HOSPITAL BED

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5 Sheets-Sheet 1

Fig. 1.



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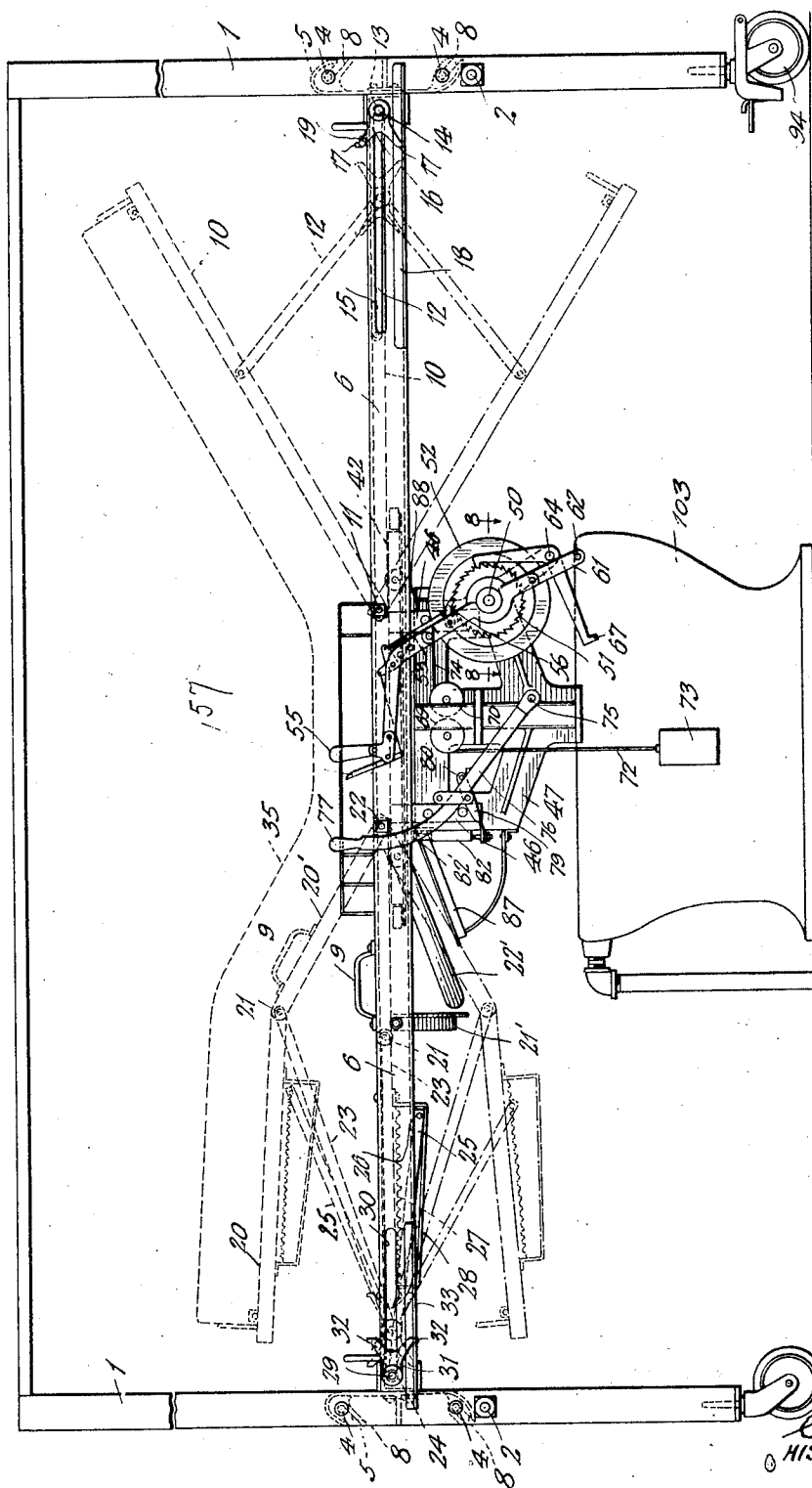
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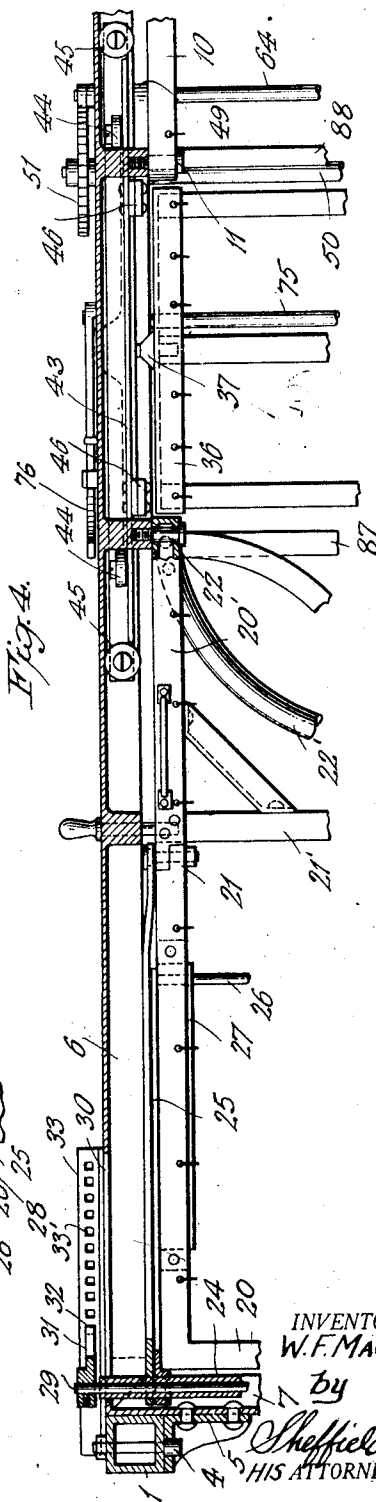
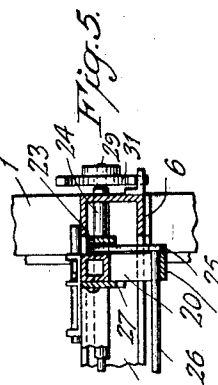
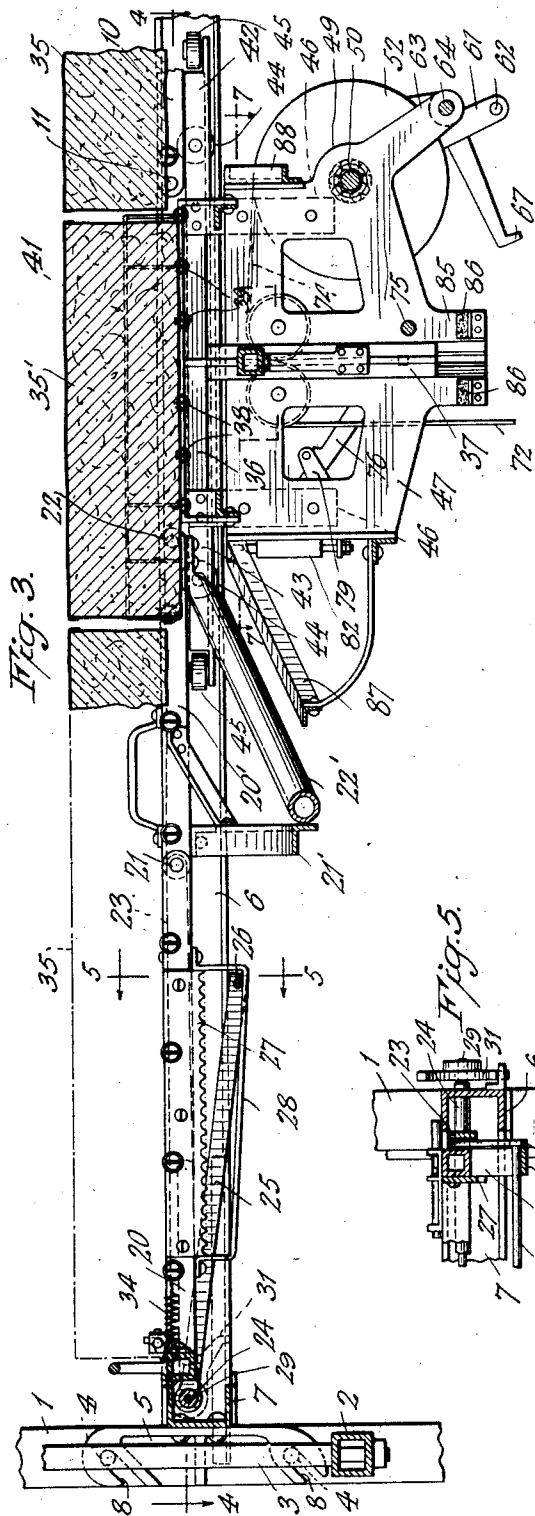
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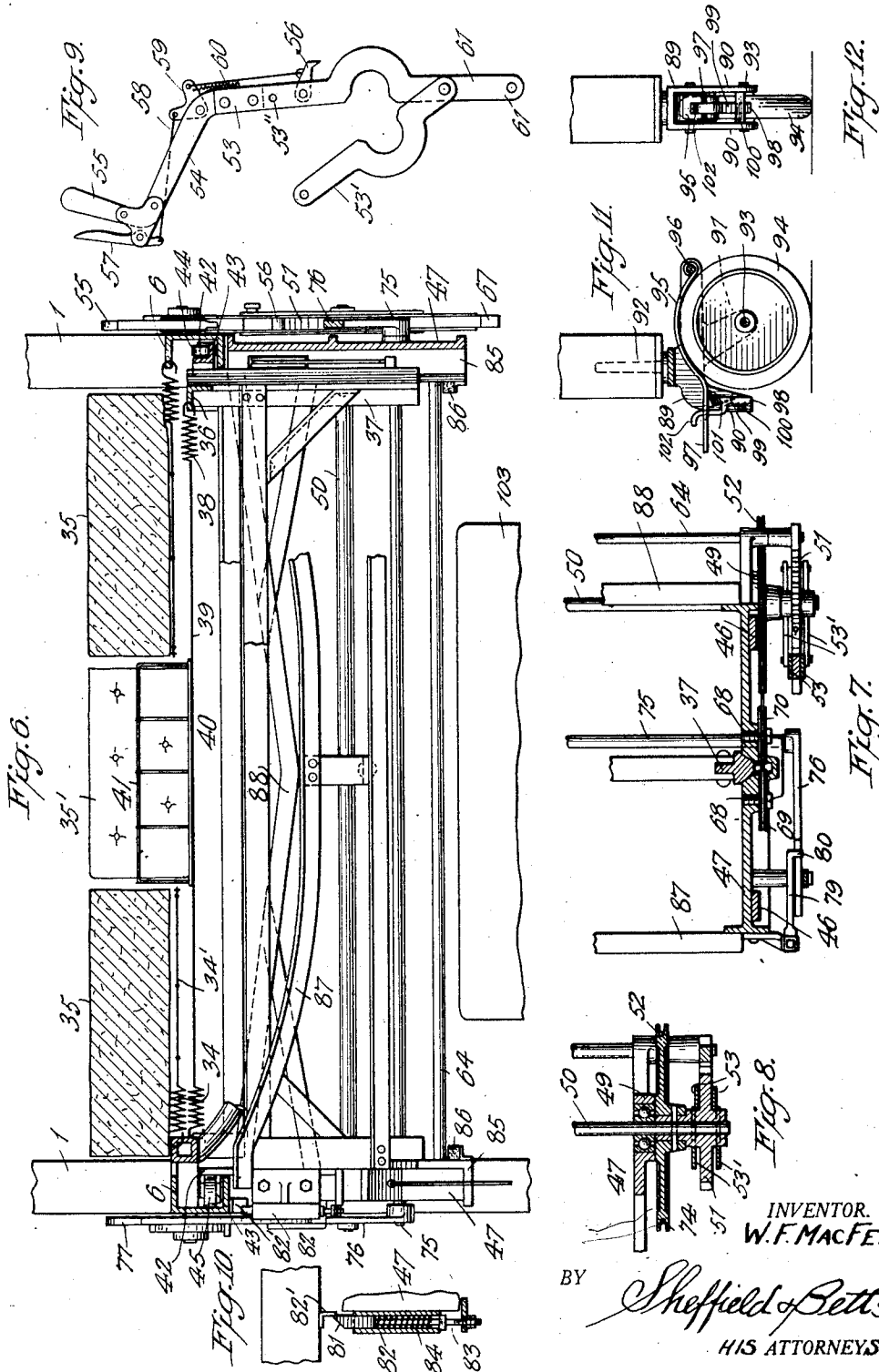
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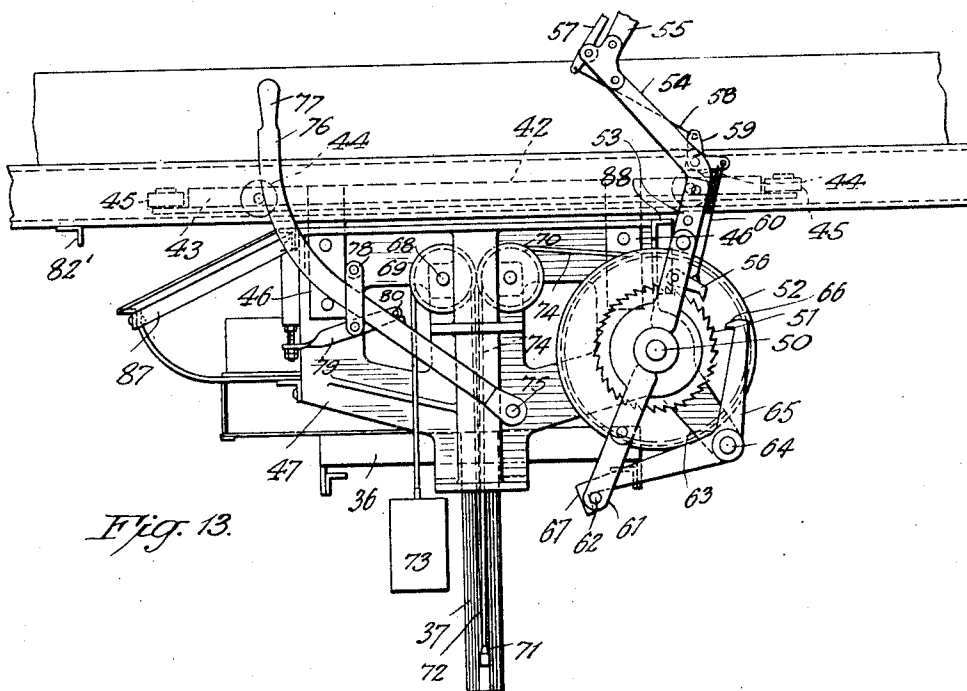


Fig. 13.

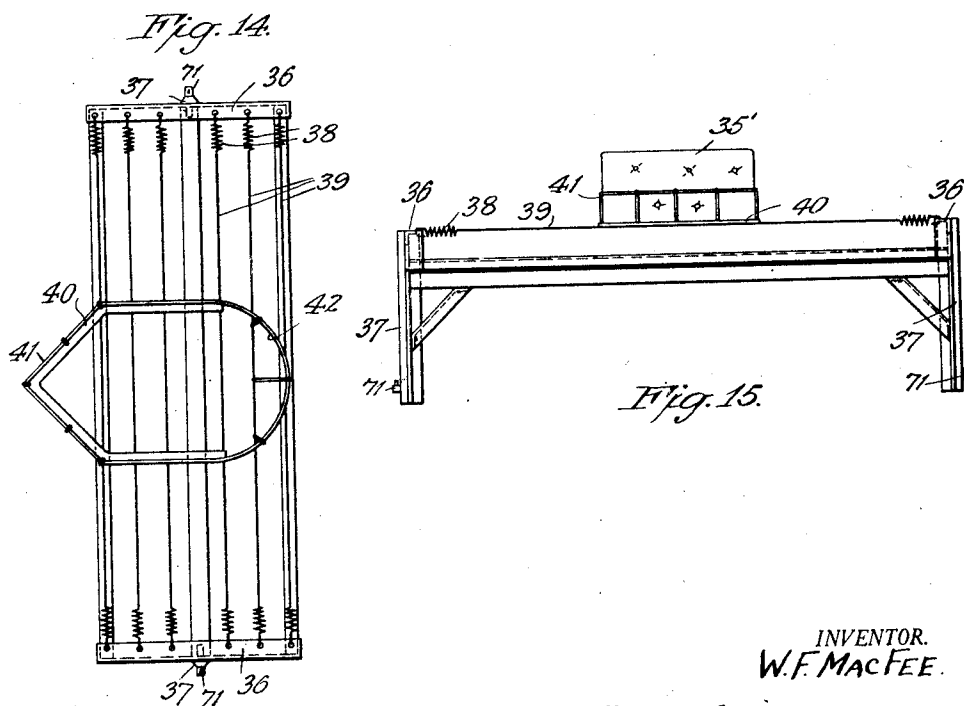


Fig. 15.

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UNITED STATES PATENT OFFICE.

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HOSPITAL BED.

Application filed June 26, 1926. Serial No. 118,710.

My invention also relates to beds for use by invalids or in hospitals and a main object is to provide easily operated means whereby the central section of the bed may be removed so that the patient may attend to the usual personal evacuations with a maximum convenience while in a reclining position in bed.

Another object of the invention is to provide means whereby various sections of the bed may be raised or lowered or otherwise positioned to accommodate the position of the patient as demanded by special treatment of the body and limbs.

Further objects will be apparent from the following description and the improvements which constitute the invention will be pointed out in the appended claims.

In the drawings, Fig. 1 is a plan view of a bed embodying my invention;

Fig. 2 is a side elevation showing the mechanism for removing the central section of the bed and showing various positions in which sections of the bed may be put to suit the requirements of the patient;

Fig. 3 is a partial side elevation showing the construction of the main frame and the movable carriage in detail;

Fig. 4 is a partial plan view taken on the line 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 3;

Fig. 6 is a cross-sectional view of the bed taken on the line 6—6 of Fig. 1;

Fig. 7 is a cross-sectional view of the carriage taken on the line 7—7 of Fig. 3;

Fig. 8 is a partial sectional view of the lifting mechanism taken on the line 8—8 of Fig. 2;

Fig. 9 is a detail view of the lifting lever;

Fig. 10 is a view of the locking mechanism used to hold the movable carriage in position;

Figs. 11 and 12 are side and end elevations respectively of the preferred form of casters used with this type of bed;

Fig. 13 is a side view of the carriage showing the construction thereof in detail and showing the removable section of the mattress in its lowermost position;

Fig. 14 is a plan view of the removable central frame; and

Fig. 15 is a side elevation thereof.

In the drawings bed supports of the usual construction are shown as comprising posts 1 which may be and preferably are of metal and have a square cross-section. Between

the posts 1 at opposite ends of the bed I provide the usual construction of cross pieces 2 connecting the posts 1 and spaced vertical members 3 between the cross pieces 2. Pins 4 are provided in the posts 1 to support the main frame of the bed. These pins 4 are placed on both sides of the bed posts at the desired level to support the horizontal frame and preferably extend through the posts 1. They project beyond the inner surface of the posts 1 a sufficient distance to engage slotted brackets 5 to be described hereinafter.

The horizontal frame of the bed comprises two longitudinal, parallel channel members 6 to which are riveted or otherwise suitably fastened, cross channel members 7 to form a rectangular frame which is braced at the corners by suitable members to give rigidity. The brackets 5 are employed for the purpose of supporting this main frame and are riveted or otherwise fastened to the ends of the cross channel members 7 as illustrated in the drawings. The brackets 5 comprise a straight portion secured to the channels 7 and have projections thereon provided with slots 8 adapted to slide over the pins 4 on the posts 1. Thus the main frame may be easily withdrawn from or placed upon the supporting pins 4. Handles 9, one of which is shown in Fig. 2, may be fastened to the inner frame 19, in order to provide means for lifting the said frame when it is desired to change the angle of the limbs of the patient.

The inner frame of the bed is composed of three sections designated as the inner frame at the head of the bed, the inner frame at the foot of the bed, and the removal central frame. The construction of these frames will now be described.

The inner frame at the head of the bed comprises a U-shaped member 10 which may be and in the preferred construction is made of a single length of tubular iron of suitable size bent into the desired shape. The frame 10 is pivoted to the channel members 6 at its opposite ends as illustrated at 11 in the drawings. The supporting members 12 are provided for the purpose of holding the frame 10 in its inclined positions. These supporting members 12 are brazed or otherwise fastened to a hollow cross tube 13 extending across the bed between the inner sides of the channel members 6. A rod 14 is located within the tube 13 and is free to rotate with respect thereto. The ends of the rod 14 extend through slots 15 in the channel members

6. Pawls or dogs 16 are securely fastened to the ends of the rod 14 outside the channel members 6. The ends 17 of the pawls 16 are designed to travel along L-shaped members 18 suitably fastened to the channel members 6, and having a series of holes 18' into which the ends 17 may be inserted to fix the frame 10 in position.

Thus when it is desired to raise the head portion of the bed into the position shown in the dotted lines of Fig. 2, the rod 14 is revolved in the tube 13 until pawls 16 are in the position illustrated in the dotted lines of this figure. The frame 10 may then be moved about pivot points 11 until the holding portion 17 of the pawls 16 is retained by the racks 18. When it is desired to lower the head portion of the bed below the level of the main frame it is necessary to withdraw slidable stop members or pins 19, illustrated in Fig. 1, which support the inner frame when it is in the horizontal position. When the stop members 19 have thus been removed the inner frame 10 may be depressed below the level of the inner frame. The rod 14 is revolved in the tube 13 until the pawls 16 are in the position shown in the dot and dash line of Fig. 2. The pawls 16 are, as previously stated, moved along the racks 18 until the frame 10 has been placed in the desired position.

The inner frame at the foot of the bed has the general U-shaped construction of the frame 10 but comprises members 20 and 20' hinged together to form a knee joint as illustrated at 21. The open ends of this U frame are likewise pivoted to the channel bars 6 by means of the pins 22. Radius rods 23 are provided to support the members 20'. These rods are connected to the knee joint 21 and pivot on the shaft 24, as described above. The supporting bars 25 are likewise fastened to the hollow shaft 24. The ends of the supporting bars 25 are connected together by a cross bar 26. The cross bar 26 is designed to be held in grooves in the racks 27 which are mounted upon the undersides of the frame members 20. A guard 28 is provided to prevent the supporting members 25 and the cross piece 26 from separating any great distance from the racks 27 when the position of the inner frame is being changed. The rod 29 is located within the tube 24 in a manner similar to that described in connection with the construction of the head frame. The ends of the rod 29 extend beyond the ends of the tube 24 and project through the slots 30 in the channel members 6. The pawls 31 are fastened to the ends of the shafts 29. The ends 32 of the pawls 31 are adapted to travel along L-shaped members 33 having a series of holes 33' into which the ends 32 may be inserted to fix the foot frame and its appurtenances in position. This inner frame is preferably supported laterally by an angle iron 21' connecting the knee joints 21 and by a curved

tubular supporting member 22' as illustrated in the drawings.

The procedure to be followed in raising or lowering the foot section of the bed supported by this inner frame will be apparent from the description given in connection with the head section of the bed.

The inner frames thus described are provided with the usual construction of springs 34 and connecting wires 34', except that the wires in the central part of the bed are arranged to leave an opening therein as illustrated in Fig. 1. The purpose of this opening will be apparent from the description of the removable central frame as given below. A mattress 35 is provided having a central opening of the form illustrated in Fig. 2. A portion 35' of the mattress 35 of corresponding shape is adapted to be fitted into the opening in the main mattress 35 and which for convenience may be termed a mattress pad. This is supported upon the removable central frame as described hereafter, so that when the central frame is in its normal position the mattress extends uninterruptedly over the entire length of the bed.

The removable central frame of the bed comprises a rectangular frame which may be and preferably is made of angle irons suitably fastened together by rivets or other means as illustrated in Figs. 14 and 15. The members 36 of this frame have depending therefrom vertical guiding members 37 suitably braced as shown in Fig. 15, and designed to slide in corresponding grooves in the movable carriage to be hereafter described. The removable frame is likewise provided with springs 38 and connecting wires 39 as illustrated in the drawings. The construction of the inner frame is such that when in its uppermost position these springs 38 and connecting wires 39 lie below the springs 34 and connecting wires 34' of the inner frames. A U-shaped member 40, as illustrated in Fig. 14, is supported upon the connecting wires 39. The ends of the parallel portions of the member 40 are turned over one of the wires to retain the member 40 in position. A mattress frame 41 is suitably fastened to the support 40 to retain the mattress pad 35' in position at one end. A frame work 42, also supported upon the connecting wires 39, is designed to retain the mattress pad in position at the other end on the removable cross frame.

A carriage 42, supported by the channels 6, is provided to carry the movable frames located on each side of the bed. The carriage 42 comprises longitudinal members 43 having rollers 44 journaled therein and adapted to roll along the inner horizontal surfaces of the channel bars 6. Rollers 45, positioned at right angles to the rollers 44 are likewise carried by the bars 43 and are adapted to roll along the inner vertical surfaces of the channel bars 6. Two arms 46 depend from

each carriage 42, as shown in Fig. 13, and support the frames 47 of the carriage. The frames 47 have the design illustrated in Figs. 3 and 13 of the drawings and have shaft bearings 49, preferably formed integral therewith on one vertical edge. The bearings 49 support a shaft 50 which extends across the width of the bed. Fastened to this shaft 50 on the outside of the frames 47 are ratchet wheels 51 and grooved pulleys 52, the ratchet wheels 51 being located outside of the pulleys 52. A lever 53 is free to rotate upon the cross shaft 50 on one side of the bed and is provided with a curved arm 54 provided with a handle 55. The lever 53 has pivoted thereon, a pawl 56 adapted to engage the teeth of the ratchets 51. The lever 53 is made in two portions (see Fig. 9) adapted to enclose the shaft 50. One of said portions 53' is pivoted to the lever 53 so that the lever 53 may be readily attached to either end of the cross shaft 50. When the lever 53 has thus been mounted upon the shaft 50, the pivoted portion 53' may be held in a position by means of a pin 53'' as illustrated. A lever 57 is pivoted on the arm 54 as shown more clearly in Fig. 9. This lever 57 is connected to the pawl 56 by means of connecting wires 58 and the bell crank lever 59. A spring 60, attached to the bell crank lever 59 and to the lever 53, maintains the pawl normally in engagement with the teeth of the ratchets 51. The lever 53 forms a projecting arm 61 having a pin 62 inserted in the end thereof. The bearings 49 have projecting members 63 extending diagonally out therefrom. In the ends of these members 63 a cross shaft 64 is free to rotate. A bell crank 65 is fastened to the end of the shaft 64 on the side of the bed on which the lever 53 may be placed. The bell crank lever forms a pawl 66 at the extremity of one of its arms which is adapted to engage with the teeth of the ratchet 51. The other arm of the bell crank is provided with a projection 67 adapted to contact with the pin 62 in the extended arm 61 of the lever 53. A lever arm (not shown) similar to the arm of the bell crank 65 having the pawl 66, is fastened to the end of the shaft 64 at the opposite side of the bed. The lower arm of the bell crank 65 is made heavier than the upright arm so that the normal position of the bell crank is such that the pawl 66 is in contact with the ratchet 51. The frames 47 are provided with two studs 68 upon which are mounted pulleys 69 and 70. The guides 37 are provided with hooks 71 to which may be fastened a rope 72 which passes over the pulleys 69 and is connected to a counterweight 73. A rope 74 is likewise connected to the hook 71 and passes over the pulleys 70 and thence is wound about the grooved pulleys 52. The frames 47 are provided with a cross shaft 75 upon the ends of which are mounted curved levers 76 having handles 77. Two stops 78 on the frame 47

restrict the movement of the lever 76. A short lever 79 is pivoted on one of these pins 78 carried on each of the frames 47. One end of the lever 79 is provided with a pin 80 which is adapted to contact with the side of the curved lever 76, the other end of the lever 79 is connected to a locking mechanism adapted to hold the movable carriage in place with respect to the main frame of the bed. The construction of this locking mechanism is better illustrated in Fig. 10. It comprises a pawl 81 adapted to slide in a bracket 82 on the frame and adapted to engage a projection 82' on the channel bars 6. The pawl 81 is provided with a rod 83 connected to the end of the lever 79. The pawls 81 are normally urged upward toward the underside of the channel bars 6 by springs 84 but do not contact with said bars.

The lower projections 85 of the frames 47 are provided with shock absorbing means such as rubber pads 86. The two spaced frames 47 of the carriage are braced laterally by transverse members 87 and 88 as illustrated.

The operation of the mechanism for removing the central portion of the mattress may be described as follows: when the mattress is in its normal position the lever 53 is in the position illustrated in Fig. 2 and the lever 57 is held away from the handle 55 by means of a spring. The operator by pulling the lever 57 toward the handle 5 causes the pawls 56 to be withdrawn from the ratchet wheels 51. When the handle 55 is then pulled to the right as shown in Fig. 13, the pin 62 carried by the projecting arm 61 engages the projection 67 on the bell crank and causes the pawl 66 to be withdrawn from the ratchet wheels 51. The mattress and the movable frame associated therewith then drop by gravity to their lowermost position being partly balanced by the counterweight 73 as they descend. The rubber pads 86 serve to absorb the shock produced by this downward movement. The locking mechanism then may be released by pulling the curved lever 76 to the right causing the pin 80 to be moved upward and the other extremity of the lever 79 to be depressed so that it pulls the pawl 81 from the stop 82'. The carriage is then moved toward the right by exerting further pressure on the handle 77 so that the carriage and its appurtenances are moved toward the head of the bed thus leaving the desired opening in the central part of the bed spring and mattress.

When it is desired to replace this removable section of the bed, the carriage and its appurtenances are drawn toward the foot of the bed by the lever 76 until it is in its normal position. The plungers 81 of the locking mechanism has moved parallel with the lower surface of the channels 6 during this movement. When the carriage has reached its

normal position, the plungers 81 will be forced over the projections 82' thus locking the carriage in position. The movable portion of the mattress may then be raised vertically into position as follows:—The lever 57 is released from the handle 55 so that the pawls 56 now engage the ratchets 51. The lever 53 is consequently turned in a clockwise direction and the bell crank 65, due to the unequal weight of its arms causes the pawls 66 to engage the ratchets 51. When the lever 53 is turned in a counter-clockwise direction the pawls 56 will slide over the teeth of the ratchets 51 according to the amount of the turning of the lever 53. If the lever 53 is now turned clockwise, the ratchets 51 will be made to rotate in the same direction. This causes the pulleys 52 to rotate similarly and to raise the movable frames. This oscillation of the lever 53 may be continued until the movable central frame has been raised into its normal position and the surface of the mattress carried thereby raised until it is flush with the surface of the bed. The lever 53 is made of two duplicate side members in the form illustrated in Fig. 9, permitting it to be located on either end of the shaft 64 so as to engage the ratchet wheels 51 at either side of the bed.

The castors illustrated in Figs. 11 and 12 comprise a yoke member 89 held in the posts 1 by means of a pin 92 in the usual manner and depending portions 90 and 91. The projection 91 is provided with an axle 93 upon which the castor wheels 94 rotate. A spring brake member 95 is secured to the member 89 by means of a pin 96 and is adapted to contact with the wheel 94 as shown. The member 95 has a horizontal portion 97 provided with a slot. The lower side of the brake member 95 is provided with an elongated projection 98 having a series of notches 99 therein. The cross bar 100 is positioned within the channel member 89 and acts as a catch. The projection 98 is normally urged against this cross bar 100 by a spring 101. A releasing member 102 is positioned within the slot 97 and contacts with the side of the projection 98 as shown. Thus when it is desired to apply the brake 95 to the wheel 94, the horizontal portion of the brake 95 is depressed by the foot until the desired pressure has been applied to the wheel 94. When the wheels are to be locked in position, the horizontal portion of the brake 95 is depressed by the foot until one of the notches 99 is retained by the cross piece 100. The locking means is released by depressing the member 102 causing the projection 98 to be moved away from the cross piece 100 so that the projection 98 may rise without the notches 99 being retained by the cross piece 100.

The bed above described may be used with any usual form of receptacle for excretions discharged by patients but I prefer in hos-

pitals or similar infirmaries to have permanent water flushing bowls as indicated at 103 in Fig. 2, located at suitable points, either in the same room or in special toilet rooms provided for them.

Having thus described this form of my invention, I do not wish to be understood as being limited to the details of form or the precise arrangement of parts set forth above, for various changes may be made by those skilled in the art without departing from the spirit and scope of my invention.

What I claim and desire to protect by Letters Patent is:

1. In a bed, a plurality of mattress frames, a removable mattress section, means for removing said section comprising, a longitudinally movable carriage, a frame for said section adapted to slide vertically within said carriage, means for moving said frame vertically comprising, hoisting drums, ratchet wheels connected therewith, a plurality of pawls adapted to engage said ratchet wheels, a lever for controlling the engagement of said pawls with said wheels to allow said hoisting drums to be revolved in either direction and flexible connecting means between said frame and said drums.
2. In a bed, a plurality of mattress frames, a removable mattress section carried by one frame, means for removing said section comprising, a plurality of longitudinally movable supports, a carriage supported thereby, locking means mounted on said carriage to hold the same in position, a frame provided with guides whereby said frame may slide vertically within said carriage, a handle pivoted on said carriage and adapted to release said locking means and to move said carriage and means mounted on said carriage for moving said frame comprising, hoisting drums, flexible connecting means between said frame and said drums and means for rotating said drums.
3. In a bed, a plurality of mattress frames, a removable mattress section, means for removing said section comprising, a longitudinally movable carriage, a frame for said section adapted to slide vertically within said carriage, means for moving said frame comprising, hoisting drums, ratchet wheels connected therewith, a plurality of pawls adapted to engage said ratchet wheels, a lever for controlling the engagement of said pawls with said wheels to allow said hoisting drums to be revolved in either direction, flexible connecting means between said frame and said drums, locking means mounted on said carriage to hold the same in position, and a handle pivoted on said carriage and adapted to release said locking means and to move said carriage.
4. In a bed, a plurality of mattress frames, a removable mattress section carried by one frame, means for removing said section com-

prising, a plurality of longitudinally movable supports, a carriage supported thereby, means for locking said carriage in position, a frame provided with guides whereby said frame may slide vertically within said carriage, means associated with said locking means for releasing the same and for moving said carriage, counterbalanced hoisting devices connected to said guides, ratchet wheels associated with said devices, a plurality of pawls adapted to engage said ratchet wheels, a plurality of levers for controlling the engagement of said pawls with said ratchet wheels whereby movement of said levers may be adapted to raise or lower said frame.

5. In a bed, a plurality of mattress frames, a removable mattress section carried by one frame, means for removing said section comprising, a plurality of longitudinally movable supports, a carriage supported thereby,

means for locking said carriage in position comprising, a catch, a pawl adapted to engage said catch, and a lever pivoted on said carriage and connected at one end to said pawl and having a stud in the other end, a frame provided with guides whereby said frame may slide vertically within said carriage, a lever pivoted on said carriage and adapted to contact with said stud whereby said locking means may be released and said carriage moved, counterbalanced hoisting devices connected to said guides, ratchet wheels associated with said devices, a plurality of pawls adapted to engage said ratchet wheels, a plurality of levers for controlling the engagement of said pawls with said ratchet wheels whereby movement of said levers may be adapted to raise or lower said frame.

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