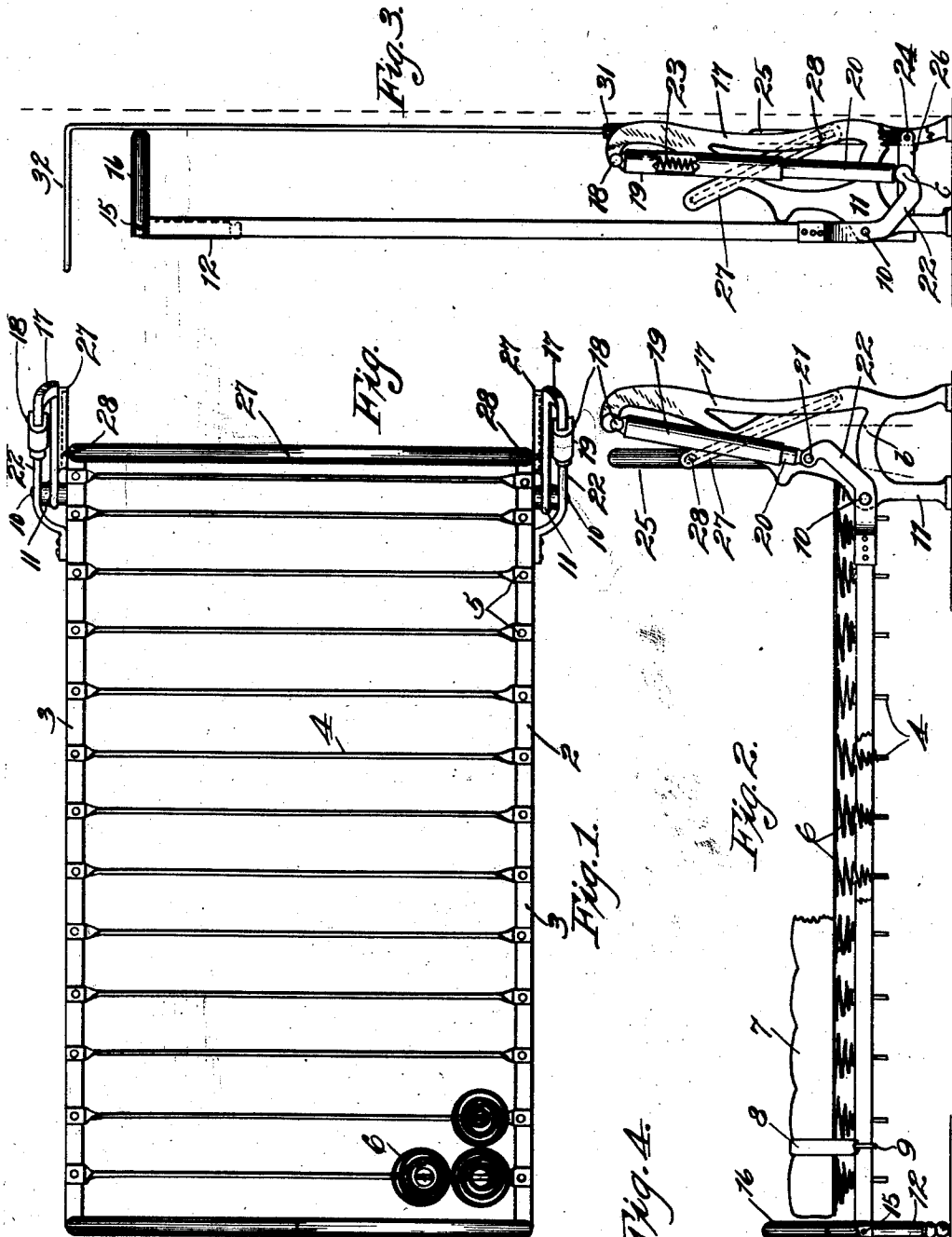


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BED.
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Fig. 4.

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To all whom it may concern:

Be it known that we, STERLING W. SMITH and ALBERT W. SMITH, both citizens of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Beds, of which the following is a specification.

This invention relates to a bed structure. The present rental values of apartment houses, apartment hotels, and other residential buildings, make it an inducement to provide furniture, and particularly beds, capable of being adjusted horizontally for occupancy, and capable of being adjusted vertically at times for the conservation of space in rooms, so that the latter may be utilized as living rooms by day without the obstruction of a bed or bed structure, and yet the bed structure may be easily and safely adjusted in horizontal position for occupancy as desired. Furthermore, it is desirable that beds of the horizontal and vertically adjustable type be designed as artistically, yet as inexpensively, as compatible with durability.

To that end it is an object of the present invention to provide a bed structure of great strength, artistic proportions, and substantial design, and which bed structure may be so mounted and counterpoised that it may be adjusted in the several positions with but slight exertion by a person. It is desirable to devise and provide a bed structure involving peculiar details of construction, which will render unnecessary the end rails of the bed; there being instead a plurality of slats or transverse bars rigidly connecting in parallelism the side rails of the bed. These bars afford means for receiving and supporting well known forms of coil springs; these springs being far more desirable for certain reasons than fabric springs particularly because of the fact that fabric springs, being largely connected to the end rails, are under great strain due to the tension of the fabric, stretching from end to end of the bed frame.

An important feature of the present invention is in so designing and connecting the elements of the bed structure that the possibility of the accidental swinging upward of the foot of the bed is practically entirely avoided, and by reason of the peculiar construction and relation of parts,

after the bed frame has once been adjusted to vertical position, it is sustained therein without necessitating or requiring a special latch or its equivalent to sustain it in vertical position.

The invention consists of the parts and the construction and combination of parts, as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of the improved bed. Fig. 2 is a side elevation of the same in horizontal position. Fig. 3 is a side elevation with the bed in vertical position. Fig. 4 is a detail sectional view of the self-centering foot leg.

It is a desideratum to provide a bed structure designed to economize the floor space occupied both when in horizontal or vertical position, and to so design the bed structure that it is semi-automatic in horizontal and vertical adjustment and is entirely automatic in relation to the adjustment of the head frame of the bed relative the mattress frame.

After an extended period of experiments and actual practice, we have devised and actually used a bed structure involving the several features of our invention.

In the illustrated embodiment of our invention is disclosed a mattress supporting frame 2. This frame 2 is of peculiar construction and comprises longitudinal or side rails 3 of appropriate length and material; these being connected transversely by a plurality of slats 4, here shown as disposed edgewise and depressed relative to the top surface of the bars 3. The ends of the slats 4 are riveted or otherwise appropriately secured, as at 5, to the top edges of the rails 3.

We have found that a frame constructed in this manner is extremely rigid, and by depressing or lowering the slats 4 at their portions between the bed rails 3, a great saving of space is produced. These bed slats 4 are here shown as being connected to the lower ends of helical springs 6, the bodies of which project below the upper edge of the bed rails 3 and the upper portions project above the rails to receive a mattress, part of which is indicated at 7. The mattress is secured by appropriate devices, as straps, one of which is indicated at 8 as hooked at 9 to the side rails of the bed.

It will be seen that the slats 4 serve the

dual function of transversely connecting and bracing the side rails 3 and are the means by which the springs 6 of the bed structure are supported. The bed frame 2 is shown as mounted adjacent its head portion upon pivots or fulcrums 10 in legs or brackets 11, which are stationary relative to the bed frame 2; that is, the brackets or legs 11 supporting the head of the bed may be attached to a suitable support, as a floor, so long as the brackets 11 serve the functions of legs for the head of the bed.

The foot end of the bed is supported when in the horizontal position upon automatically operating legs 12, which are here shown as provided with upper conical ends 13, slotted as at 14, to play up and down a pivot 15, of which there is one in each end of the foot rail 16 secured to the side rails 3 of the bed frame. As the bed frame 2 is lifted from a position shown in Fig. 2, the weight of the legs 12 will prevent their being lifted by the bed frame 2, until the pins 15 engage the upper end walls of the slots 14, and thereafter as the bed frame 2 is swung about the fulcrums 10, the legs 12 will swing on the pins or pivots 15 until they assume the position shown in dotted lines in Fig. 3 substantially parallel with the vertical rails 3 of the bed. As the bed frame 2 is swung from vertical position, Fig. 3, the legs 12 will hang in a vertical position about the pivots 15, until the bed frame 2 approaches the horizontal position, when the upper conical ends 13 of the legs will enter conical seats 13' of the foot rail 16; thereby automatically centering the legs 12 with relation to the adjacent portions of the foot frame 16.

One of the important features of this invention is the means whereby the bed frame 2 is semi-automatically moved from a point approximately horizontal to the vertical position. As here shown, each of these supporting brackets or legs is designed with an upwardly projecting portion 17, to which is pivoted at 18 a sleeve or shell 19 of suitable proportions, within which is telescopic a bushing or plunger 20. The lower end of the bushing 20 is pivoted at 21 to an arm 22, of which there is one on each side of the bed; these arms being shown in the present instance as attached to the side rails 3 and offset sufficiently therefrom to straddle the fulcrum or bearing portion 10 of the legs 11.

In producing a semi-automatic or automatically adjustable and tiltable bed, it is found extremely expedient and desirable that the force required to move the bed be applied in such a manner that it will be practically ineffective and inoperative when the bed is in a horizontal position, but at the same time the force utilized in assisting the movement of the bed to the vertical position should be so applied as to efficiently

move the bed after it has started from its horizontal position to and maintain it in the vertical position. We have accomplished this semi-automatic movement and automatic sustaining of the bed in the vertical position by locating the point of pressure or pivots 21 of the arms 22 with such relation to the bed fulcrums 10 that when the bed is in a horizontal position, the agency employed to assist in the upward movement will be, to all intents and purposes, inert or so nearly inert as to be devoid of sufficient power to automatically lift the bed from its horizontal position.

Numerous agencies of force may be utilized to swing the bed upwardly about the fulcrums 10, but we have found it expedient, inexpensive and practicable to employ expansible springs 23 which we interpose between the pivots 18 of the brackets 17 and the pivots 21 of the arms 22, and within the telescopic tubes 19 and 20. These springs are designed to have sufficient resiliency and expansibility to be ample to lift or swing the bed upwardly, after it has been lifted a slight distance from the horizontal plane.

In accomplishing the desired application of force to the tiltable bed in a vertical manner, we have determined and practised that by locating the points of pressure or pivots 21 of the arms at a point between 30 and 80 degrees with relation to, and back of, the fulcrums 10, the force of the springs or other lifting agencies employed will produce most satisfactorily the desired action of the bed. With the point of pressure 21 located within the range of arc stated or at a point approximately 45 degrees relative the fulcrums 10 when the bed is turned in the horizontal position, Fig. 2, the line of force from the stationary point 10 through the expansible agencies, as springs 23, and from the point 21 is brought so close to the fulcrums 10 that the pressure of the springs is rendered totally ineffective to lift the bed frame 3 without a certain amount of force being applied to the outer or foot end of the bed structure.

Considering the bed frame 3 as a lever of the first order, having a short arm represented between the points 10 and 21 and a long arm represented between the fulcrums 10 and the foot of the bed, it is manifest that the application of little force at the outer or foot end of the bed will be sufficient to start its upward movement; whereas, with the head of the bed between the fulcrums 10 and rear of the brackets 11, the shortness of the lever will require the application of a relatively great force to produce the upward movement of the foot of the bed, and herein is seen the advantage of disposing the points of pressure as at 21 with such relation to the fulcrums 10 that the force of the

lifting agencies or springs 23 will be so gradually diminished, due to the swinging of its leverage relative the point 10, that the lifting agencies will become substantially inert.

As an individual starts the upward movement of the bed structure 3 about the fulcrums 10, the points 21 will swing backwardly in an arc, so that eventually the points 21 will be brought into a plane with the fulcrums 10, at which time the lifting agencies 23 will be exerting a force amply sufficient, due to the increase of the arm of the lever relatively between the points 10 and a point indicated at B, at which time the force of the springs 23 will be acting, due to the combination of the increase of leverage and their inherent expansibility with a force amply sufficient to carry the bed upwardly without violence. As the points 21 continue to swing in their arc about the fulcrums 10, the springs 23 will continue to expand, and when the bed frame 3 has finally reached its vertical position, the points 21 will be in a position indicated in Fig. 2; the springs 23 still acting with sufficient force to safely maintain the bed frame 3 in vertical adjustment. Thus, it will be seen that the peculiar relation of the points 21 to the fulcrum 10 is of great advantage and produces a bed structure which may be operated with ease by a proper person.

When the bed is in the vertical position, it is found that a child under the age of discretion would not be able to pull the bed downwardly, because of the fact that he could not reach sufficiently high to apply force enough to move the bed from its automatically sustained position, due to the action of the spring 23. An adult, it is found, has no difficulty in pulling the bed downwardly, when desired, because, being able to reach higher on the frame, has the advantage of the greater leverage between the fulcrums 10 and the upper end of the foot of the bed.

In order to provide an artistic and readily salable bed structure, we connect to the frame 3 at pivots 24 a head frame 25 of suitable design, which is adapted to fold about the pivots 24 when adjusted vertically as shown in Fig. 3, and to extend at right angles to the bed frame 3 when the latter is adjusted to the position shown in Fig. 2. The pivots 24 are shown as connected to the upper ends of arms 26 standing at a right angle to the bed frame 3; the length of the arm 26 being sufficient to hold the head frame 25 when the bed is adjusted vertically, sufficiently distant therefrom to admit the mattress and bed-clothes without unduly compressing the same.

It is a desirable and important feature of beds of this type to automatically cause the

folding of the head frame 25 with relation to the bed frame 3 during the movements of the latter, and in order to accomplish this automatic folding, there is formed on the sides of the arms 17 adjacent the ends of the bed-frame 25 guideways 27, in which are slidable pins 28 projecting from the adjacent ends of the head frame 25 and constantly engaging the walls of the guideways 27. Thus, by reason of the engagement of the pins 28 with the guideways 27, as the bed frame 3 is moved from the vertical to the horizontal position, the pins 28 of the head frame will slide upwardly in the guideways, until, when the head frame 25 has finally arrived at the position indicated in Fig. 2, it will be sustained there by the engagement of the pins 28 with the upper walls of the guideways 27. Conversely, when the bed frame 3 is swung upwardly, the pins 28 of the head frame 25 will slide downwardly and control the head frame 25 constantly, until it finally assumes the position shown in Fig. 3, when the bed frame 3 is in vertical position.

There may be provided and attached to the bracket arms 17 an appropriately designed, upwardly projecting frame 30, the lower ends of which are insertible in sockets 31; the frame being designed to support at its upper, outwardly projecting portion 32 a portière or other inclosing curtain or fabric, so that when the bed has been adjusted in vertical position, the portière may be folded around in front of the bed to entirely conceal it.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. A bed including fixed vertically disposed standard brackets, side bed rails pivoted to the lower portion of the brackets, and having angular extensions beyond the pivots, telescopic tubes, one member of each of which is pivoted to the bed rail extensions and the other to the upper ends of the brackets, and normally compressed springs located in the tubes and reacting in unison upon the extension of the bed rail.

2. A bed including fixed vertically disposed standard brackets, side bed rails pivoted to the lower portion of the brackets, and having angular extensions beyond the pivots, telescopic tubes, one member of each of which is pivoted to the bed rail extensions and the other to the upper ends of the brackets, normally compressed springs located in the tubes and acting in unison to upwardly swing the bed, a head board pivoted to extensions of the side rails, diagonally disposed guideways on the brackets, and projections from the head board engaging the guides.

3. The combination in a bed of a tiltable frame, a bracket structure at one end there-

of said structure having pivots about which the bed may turn, a counterbalance, connected to the bracket structure for swinging the frame from a position approximately horizontal, and means for rendering the counterbalance ineffective when the bed frame is substantially horizontal, said means including extensions on the frame projecting rearwardly and upwardly from the plane of said frame beyond the pivots to which extensions the counterbalance is connected.

4. A fulcrumed, tiltable bed, having upwardly curved arms extending beyond the fulcrum, and movable in arcs, and guided springs having one end connected with a fixed support and the other with the ends of the arms, said springs being compressed with gradually increasing pressure during the descent of the bed to approximately mid-distance, and with diminished pressure

as the bed approaches its horizontal position.

5. A bed comprising a frame, an upwardly extending bracket structure, to the lower part of which the side bars of the frame are pivoted, upwardly curved arms extending from the side bars beyond the pivot points, telescopically acting tubes, one of which is swiveled to a pivot at the top of the bracket and the others to the upturned ends of the arms, and springs compressible and maintained in alinement by said tubes.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

STERLING W. SMITH.
ALBERT W. SMITH.

Witnesses:

SID. S. PALMER,
EDITH W. SMITH.