J. WELSH.

FOLDING BED.

APPLICATION FILED SEPT. 28, 1912.

1,050,319.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

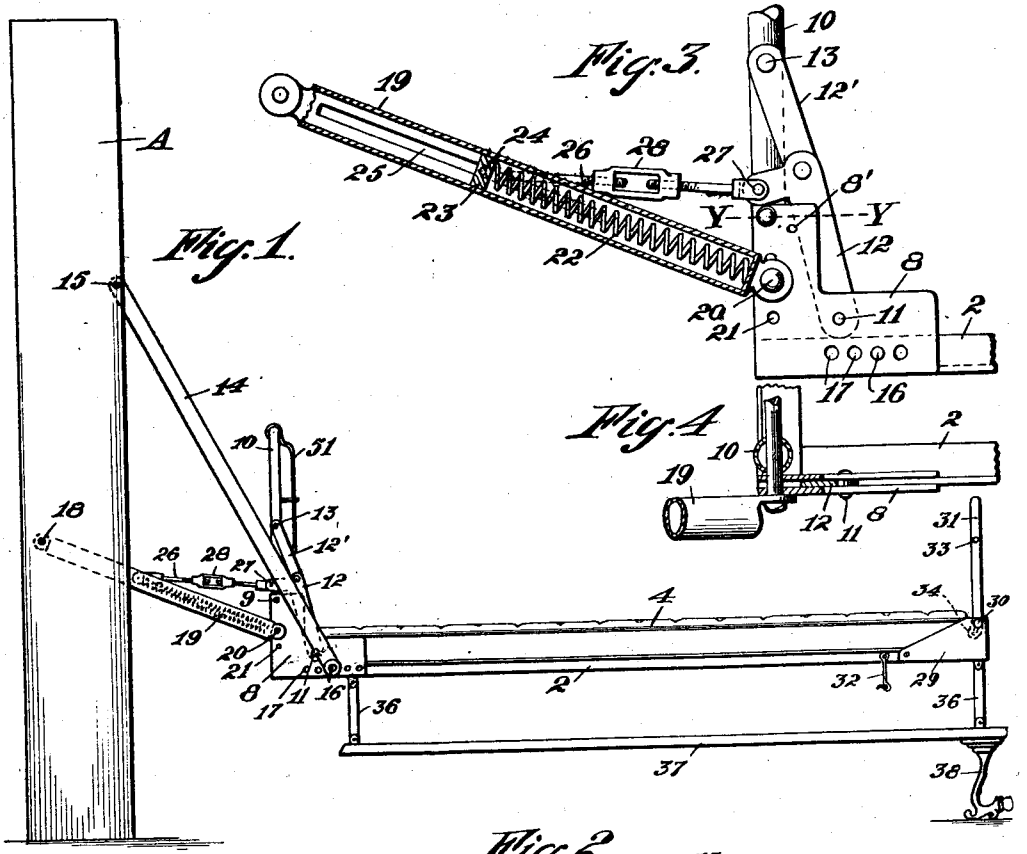
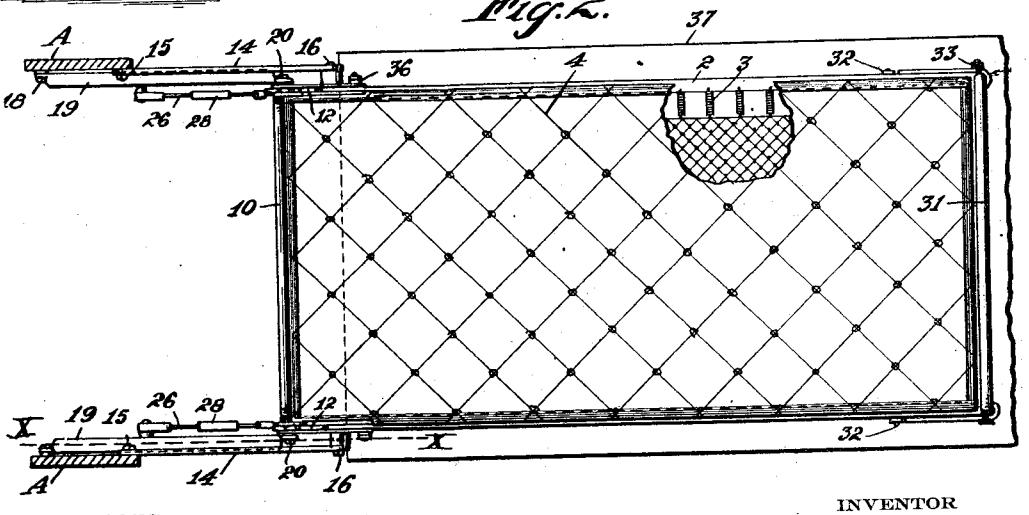


Fig. 3.

Fig. 4.

Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 5.

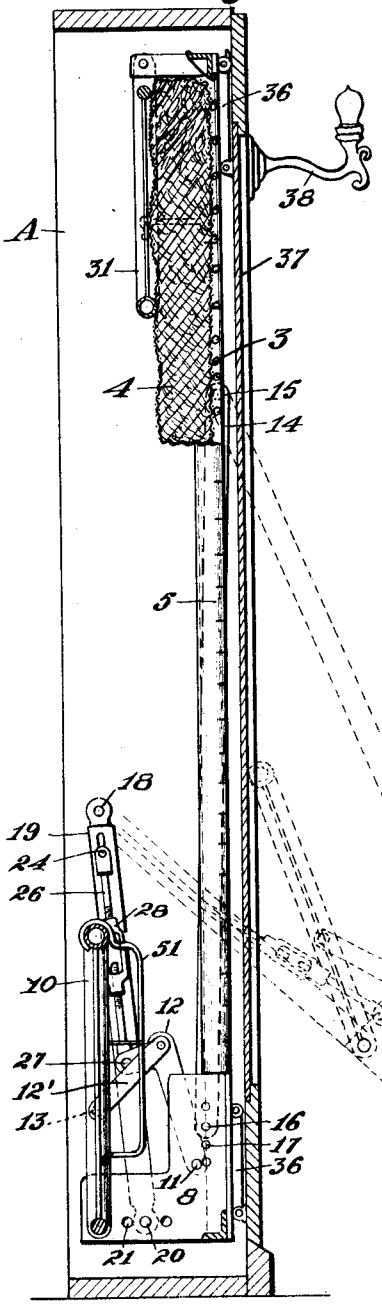


Fig. 6.

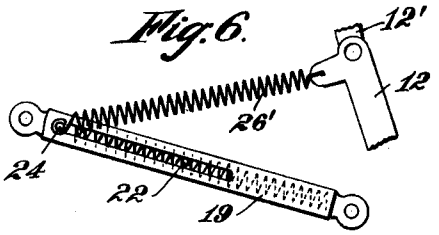


Fig. 7.

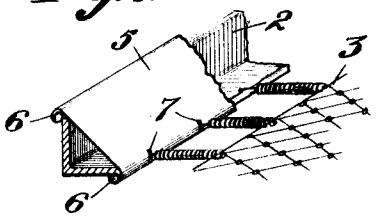


Fig. 10.

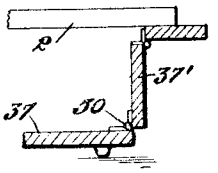


Fig. 8.

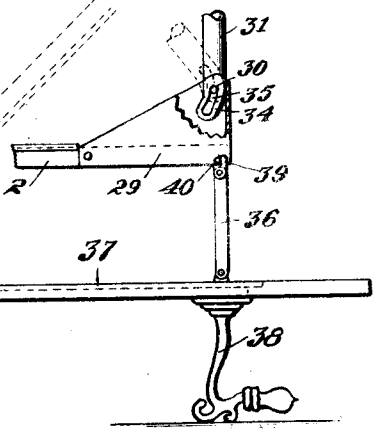
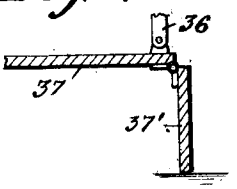


Fig. 9.



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UNITED STATES PATENT OFFICE.

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FOLDING BED.

1,050,319. Specification of Letters Patent. Patented Jan. 14, 1913.

Application filed September 28, 1912. Serial No. 722,867.

To all whom it may concern:

Be it known that I, JOHN WELSH, a citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Folding Beds, of which the following is a specification.

This invention relates to a folding-bed.

It is the object of this invention to provide a folding-bed which may be readily folded and unfolded, and which, when folded, will be compact and occupy but a small space.

Another object is to provide a novel means for balancing the bed which is simple in construction and operation.

A further object is to provide a folding bed which is adapted to be swung vertically in and out of a recess and in which the closure for the recess will form a support for the bed when in its open position.

Other objects will appear hereinafter.

The invention primarily resides in a bed frame suspended at its head end on links pivoted to the casing or jamb of a recess into which the bed is to be folded; spring means for balancing the bed frame; link connections for causing the bed frame to swing in and out of the casing on its supporting links and carrying the balancing springs; pivoted head and foot portions on the bed frame; means for automatically folding and unfolding the head portion on the raising and lowering of the bed; means by which the foot portion may be utilized as a mattress clamp; and means by which the closure for the bed receiving recess will serve as a support for the bed when in its open position.

The invention further 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 side elevation of the bed in its open or unfolded position. Fig. 2 is a plan view of same with parts broken away. Fig. 3 is a detail section and elevation on the line X—X of Fig. 2. Fig. 4 is a horizontal section on the line Y—Y of Fig. 3. Fig. 5 is a vertical section partly in elevation and with portions broken away, showing the bed in its folded position. Fig. 6 is a detail showing a modified form of the spring balance mechanism. Fig. 7 is a detail in perspective, illustrating the manner of constructing the rails of the bed frame. Fig. 8 is a detail side elevation of the foot of the bed in its open position, showing the manner of supporting the same. Fig. 9 is a detail of a modified form of the support for the foot of the bed. Fig. 10 is a detail of a further modified form of the support for the foot of the bed.

In the drawings A—A represents the side walls or jambs of a casing of any suitable description, into which the bed is to be folded, and which may be in the form of a closet built permanently in a partition or wall; or may be mounted on a base and adapted to be moved from place to place.

The bed frame consists of the usual side and end rails arranged in the form of a rectangle; the side and end rails being here shown as constructed of angle-iron 2 with the lower horizontal flange turned inwardly, as shown in Fig. 7. Woven wire springs 3 of any suitable description are secured to the inwardly extending flanges of the side and end rails, and are designed to span the space inclosed by the angle-iron bed frame to support a mattress 4 of any suitable construction. As a means of finishing the angle-iron 2 forming the side and end rails, to obviate the sharp corners thereof, the angle of the rails is spanned by a sheet-metal plate 5, the outer edges of which are beaded at 6 and turned over the outer edges of the rails to clench the plates 5 on the rails, and at the same time form rounded edges thereon, as shown in Fig. 7. The plates 5 are slotted at 7 to admit of the springs 3 being attached to the angle-iron therebeneath.

Mounted on the side rails at the head portion of the bed frame are vertically extending plates 8 adjacent the upper ends of which a foldable head piece 10 is pivoted at 9, and pivotally mounted at 11 on each of the plates 8 are toggle links 12 and 12′; the links 12′ being pivotally connected at 13 to the sides or ends of the head piece. The toggle links 12—12′ are arranged to fold toward the foot of the bed but are limited to a substantially alined position when the bed is open, by means of stops 8′ carried by the plates 8. The head portion of the frame is supported upon links 14 of considerable length, which depend from pivots 15 on the casing A—A, and are pivotally connected at 16 to the plates 8 a short distance forward of the rear end rail of the frame, approximately on a level therewith and at a

point forward of and below the connections 11 of the toggle links 12. The pivotal connections 16 between the links 14 and the bed frame consists of bolts which are inserted in any one of a series of perforations 17 formed in the plates 8, which perforations admit of ready adjustment of the pivotal relation between the bed frame and the supporting links 14, to vary the length of the forward portion of the bed extending beyond its pivot point and facilitates regulating the overthrow.

Pivotally connected at 18 to the side panels of the casing A—A, rearward of and below the pivotal supports 15 of the links 14, is a pair of cylindrical or tubular links 19, which are connected at their outer ends to the plates 8 on each side of the bed frame, by means of pivot pins 20; the pins 20 being inserted in any one of a series of perforations 21 arranged along the back edges of the plates 8 rearward of and above the pivotal connections 16 of the links 14. The perforations 21 admit of adjustment of the pivotal connection between the links 19 and the bed frame to vary the extent of the outward thrust of the links when the bed is lowered, and to also vary the relations of the pivot pins 20 of the thrust links 19, with the connections 16 of the supporting links 14. Mounted within the tubular thrust links 19 are expansible springs 22, the inner ends of which bear against the inner ends of the links 19, while their outer ends bear against blocks 23, slidably mounted therein, and which blocks are connected by means of pins 24 extending through longitudinal slots 25 formed in the links 19, to connecting rods 26 which lead to and are pivotally connected at 27 to the toggle links 12—12′ adjacent their points of connection. The connecting rods 26 are threaded to receive turn-buckles 28, which admit of the length of the rods 26 being adjusted to regulate the tension of the springs 22. It will be observed that the springs 22 normally exert a pull on the bed frame through the links 12—12′ at a point rearward of the pivotal connections 16 of the bed frame and its supporting links 14, tending to straighten the toggle links 12—12′ and serving to balance the weight of the bed forward of the pivots 16.

Mounted on the foot end of the side rails of the bed frame are vertical plates 29 which are connected at their upper ends by means of a horizontally disposed rod 30, and mounted to swing in a vertical direction on the rod 30, is a foot piece 31. This foot piece 31 is designed to be folded down over the mattress 4, as shown in Fig. 5, and locked in its innermost position by means of hooks 32 on the side rails of the bed frame, which engage headed pins 33 at the ends of the foot piece 31. When the foot piece 31 is thus folded down and secured by the hooks 32 to the bed frame, it acts as a clamp to engage the foot portion of the mattress 4 and the bedding thereon to prevent their falling when the bed is elevated to its vertical position, as shown in Fig. 5. Means are provided for locking the foot piece 31 in a vertical position when the bed frame is down, which means includes curved end portions 34 formed on the lower ends of the end members of the foot piece 31, and curved slots 35 formed in the curved portions 34, through which the rod 30 extends. When the foot piece 31 is in a vertical position, the rod 30 is disposed in the upper ends of the curved slots 35; a flat portion of the end members of the foot piece 31 then abutting against a vertical inwardly extending portion of the plates 29 in such manner as to retain the foot piece 31 in a vertical position. When it is desired to lower or fold the foot piece 31, it is lifted upwardly to position the rod 30 in the lower ends of the slots 35; this being done, the foot piece 31 may be freely moved in a downward direction into its folded position, as indicated in dotted lines in Fig. 8.

Pivotally connected to the under side of the side rails of the bed frame, adjacent its foot and head ends, are links 36, which are pivoted at their outer ends to a panel 37 which is designed to form a closure for the casing A—A when the bed is in its vertical position, as shown in Fig. 5, and to form a support for the bed when in its horizontal position, as shown in Figs. 1 and 2. If desired the links 36 may be made of such length that the panel 37 will rest on the floor when the bed is in a horizontal position. In this case I have shown the upper end of the panel 37 as provided with brackets 38 which serve as legs when the panel is in a horizontal position, and supported clear of the floor, as shown in Fig. 1; it may, however, be formed with a downwardly swinging hinged upper portion, as shown at 37′ in Fig. 9, which, when turned downwardly will serve as a support for the panel and the bed when the latter is unfolded.

In the operation of the invention, when it is desired to move the bed from its closed to its open position, a pull is exerted upon the brackets 38, or other portion of the panel 37, which pull is transmitted through the links 36 to the upper or foot portion of the bed frame, causing it to swing outwardly from the casing A—A. The bed frame in moving outwardly at its upper end rocks on the pivotal connection 16 on the supporting links 14, and at the same time swings outwardly away from the casing A—A. This latter movement is induced by the action of the thrust links 19, the pivotal connections of which are so arranged that when the foot of the bed is moved outwardly and down-

wardly, and the head is moved inwardly and upwardly in relation to the pivotal point of support 16 on the links 14, the outer ends of the thrust links 19 will swing upwardly toward the horizontal on an arc of a circle radiating from their pivotal mountings 18, and thereby crowd the bed frame in an outward direction; the head end of the bed frame moving upward and outward as the links 14 move out of their vertical positions, as indicated in dotted lines in Fig. 5. The toggle links 12 and the connecting rods 26 are substantially in alinement when the bed frame stands vertical, and until it assumes an angle of approximately 45°, or until the rearward movement of the toggle links 12 in relation to the bed frame is arrested by the stop 8′. The connections 11 of the toggle links 12 moving downward on an arc of a circle in relation to the connections 20 of the thrust links 19 cause the connecting rods 26 to move longitudinally in relation to the thrust links, 19, thereby compressing the springs 22. The springs 22 will thus exert a backward pull upon the toggle links 12—12′ through the connecting rods 26, tending to straighten the toggle links 12 and 12′ in relation to each other, thereby moving the head piece 10 from the position shown in Fig. 5, in which it parallels the bed frame, to the position shown in Fig. 1, at right angles thereto. The springs 22 are of such tension that as the bed frame rocks forward on the pivots 16, the compression of the springs, as the block 23 is carried forward in the link 19 by the connecting rods 26, the weight of the outer end of the bed frame as it moves downward will be practically balanced. The toggle links 12 on being arrested by the stop 8′ cause the connecting rods 26 to turn on the pivots 27 and move into angular relation to the toggle links; the connecting rods continuing their longitudinal movement and acting to compress the springs 22 until the bed reaches its open or horizontal position, whereupon the toggle links 12 and 12′ will be disposed in alinement forming, in conjunction with the links 14 and 19, what is known as a "lock on the floor" and securely holding the bed in its open position with its head supported on the links 14. As the bed frame nears the floor, the panel 37 swings downwardly on the links 36 so that when the bed frame is in a horizontal position, the links 36 will be in a vertical position, and the brackets 38 will rest upon the floor and thereby form a support for the foot end of the bed frame, the head end of which is carried and supported upon the links 14. By forming the links 36 with fingers 39 on their upper ends, which are engageable with stops 40 on the bed frame, they will be prevented from swinging beyond a vertical position. The foot portion 31 is then raised to its vertical position after the hooks 32 have been disengaged from the pins 33; the foot portion being folded back on top of the mattress 4 and locked in its folded position to clamp the mattress and bed-clothes when it is desired to fold the bed.

In folding the bed, the operation previously described is reversed. An upward pull on the foot end of the bed acts to rock it on the pivots 16, the springs 22 expanding in the links 19, and exerting a pull through the connecting rods 26 and the toggle links 12 and 12′ to assist in restoring the bed frame to its normal position, and also acting through the toggle links to fold the head 10 against the mattress 4. When the bed assumes its vertical position in the casing A—A, the panel 37 will swing downwardly into position, as shown in Fig. 5, and thereby form a closure for the casing A—A and thus inclose the bed from view. In some instances where space will not admit of springs of sufficient length being placed on the thrust links 19, it may be necessary to dispense with the connecting rods 26 and use spring members 26′ in lieu thereof, as shown in Fig. 6. By this construction a greater length of spring, and consequently a greater spring action may be obtained. By connecting the panel 37 to the bed frame by links 36, the panel swings clear of the underside of the bed frame, thereby permitting the springs 3 to be depressed when the bed is in the open position, which would not be possible if the panel was rigidly attached to the underside of the frame. This construction admits of the bed being folded into a narrow or shallower space than would be possible with the panel rigidly mounted on the underside of the frame, which, for the proper operation of the springs, would necessitate their being positioned above the bed frame, thereby requiring additional space in the casing A—A.

An important feature of this invention resides in the fact that the bed frame swings out away from the casing A—A when opened. This is readily appreciated where the casing A—A is formed in a wall or partition, as the bed will then be positioned with its head some distance from the wall when ready for occupancy.

If desired, the upper end of the panel 37 may be hinged to the foot of the bed frame, as shown in Fig. 10, in which event it is divided transversely and hinged as at 50, in such manner that when the bed is lowered, a portion 37′ of the panel will form a support for the outer end thereof. By this construction the end of the panel will not be advanced beyond the foot of the bed.

A guard 51 is provided for the pillows of the bed to prevent their being crushed when the bed is folded. This guard consists of a wire frame which is pivoted to the upper

rail of the head piece 10, and is adapted to swing in front of the pillows to inclose them against the head piece.

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

1. In a folding bed, the combination with a bed frame and a casing, of supporting links connecting the bed frame and casing, thrust links connecting the bed and casing, springs carried on said thrust links, and connections between said springs and the bed frame whereby they will act to balance the forward portion of the bed.

2. In a folding bed the combination with a bed frame and a casing therefor, of depending links on the casing supporting the head end of the bed, thrust links connecting the bed to the casing, springs for balancing the bed on its vertical movement carried on the thrust links, and means for adjusting the tension of the springs.

3. In a folding bed the combination with a casing, of a bed frame, supporting links on the casing carrying the head end of the bed frame, links on the casing and frame for inducing a rocking movement of the supporting links, springs on said links for balancing the bed, and a panel forming a closure for the casing linked to the underside of the bed frame, said panel also forming a support for the foot end of the bed when it is in its open position.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN WELSH.

Witnesses:
RALPH FREY,
GEO. L. BRUNS.