(No Model.) 4 Sheets—Sheet 1

H. S. HALE.

FOLDING BED.

No. 262,181. Patented Aug. 1, 1882.

Fig. 1.

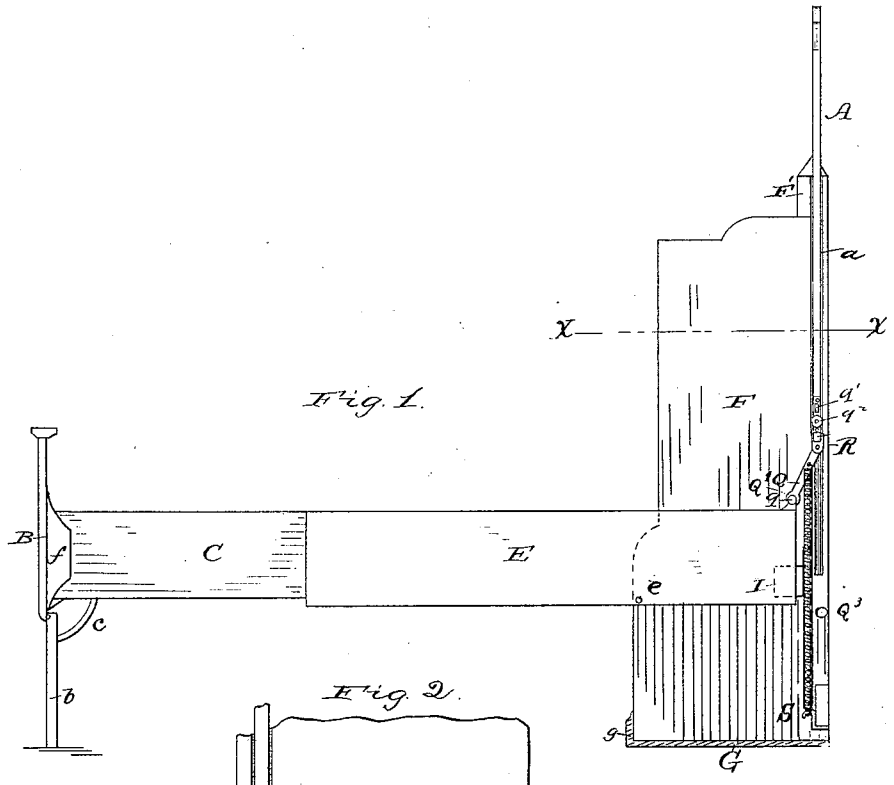


Fig. 2.

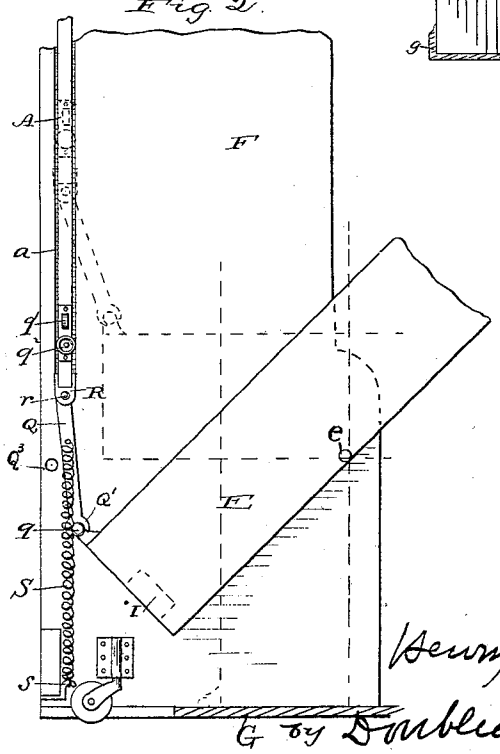
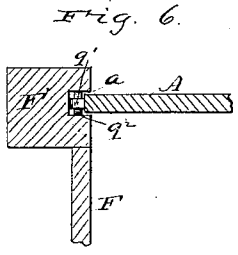


Fig. 6.



Witnesses:

H. N. Low

L. H. Marshall.

Inventor:

Henry S. Hale

by Dodbridge & Bliss

Attys.

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 4 Sheets—Sheet 2.

H. S. HALE.

FOLDING BED.

No. 262,181. Patented Aug. 1, 1882.

Fig. 3.

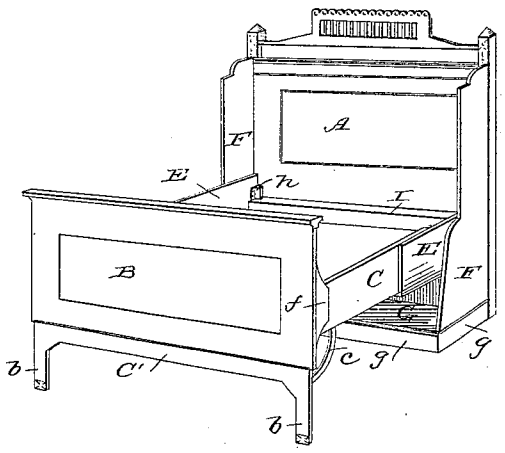


Fig. 4.

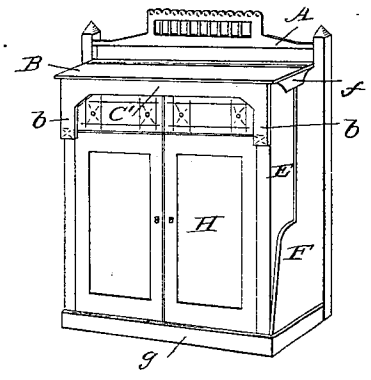
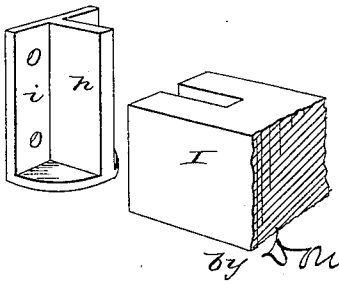


Fig. 5



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(No Model.)

4 Sheets—Sheet 3.

H. S. HALE.

FOLDING BED.

No. 262,181. Patented Aug. 1, 1882.

Fig. 7.

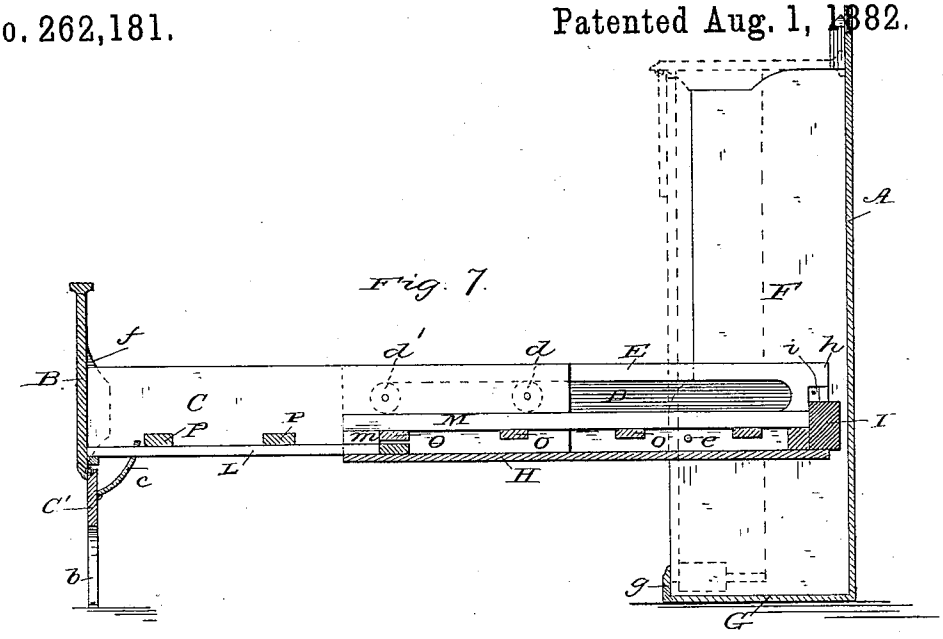
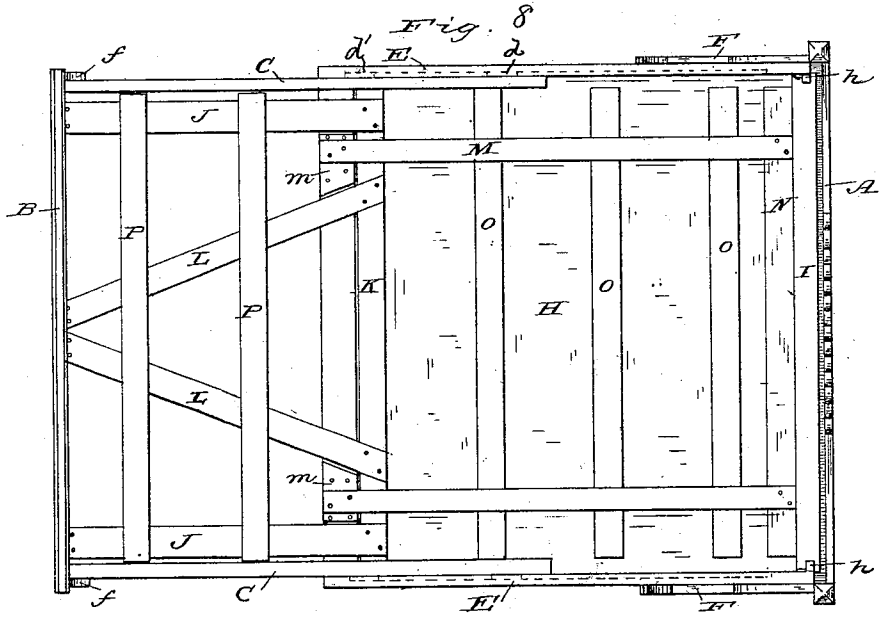


Fig. 8



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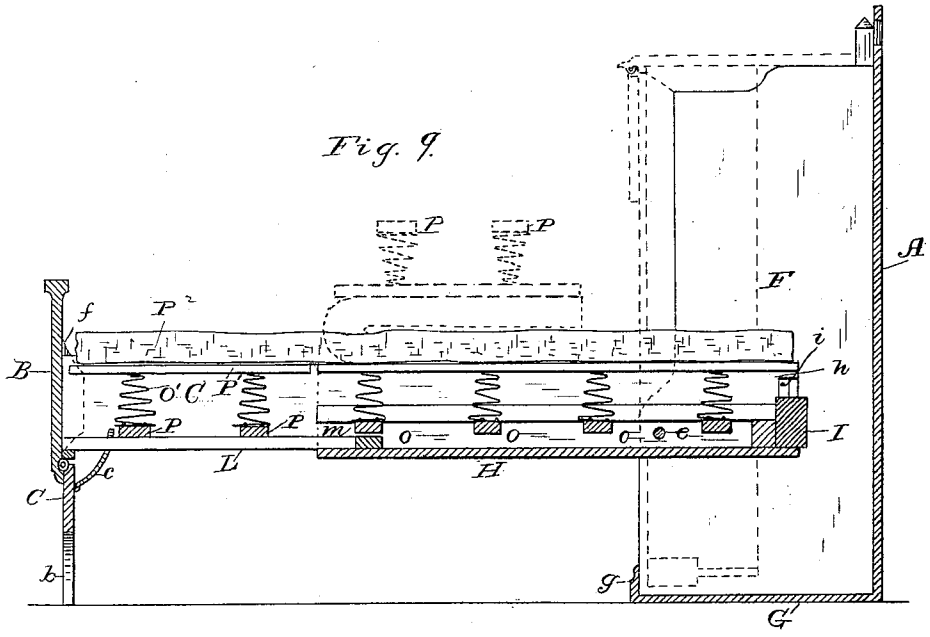
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H. S. HALE.

FOLDING BED.

No. 262,181. Patented Aug. 1, 1882.

Fig. 9.



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UNITED STATES PATENT OFFICE.

HENRY S. HALE, OF PHILADELPHIA, PENNSYLVANIA.

FOLDING BED.

SPECIFICATION forming part of Letters Patent No. 262,181, dated August 1, 1882.

Application filed May 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. HALE, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Folding Beds, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation of a bed having my improvements, one side piece of the head portion being removed, the bed being shown as let down and extended. Fig. 2 is a similar view of a portion of the bed, taken from the opposite side and on an enlarged scale, the bed being shown at an angle of about forty-five degrees. Fig. 3 is a perspective of my improved bed while in the position shown in side elevation in Fig. 1. Fig. 4 is a perspective of the same shortened and closed up. Fig. 5 is a detached view of the counterbalancing-weight and also the brackets by means of which it is attached to the bed. Fig. 6 is a cross-section on the line *x x* of Fig. 1. Fig. 7 is a central longitudinal section of a bed having a stationary head-board, a weight being relied on to counterbalance the bed. Fig. 8 is a top plan view of the bed shown in section in Fig. 7. Fig. 9 is a sectional view similar to that shown in Fig. 7, except that it shows the bed provided with springs and a mattress, these being shown in full lines in the position occupied when the bed is in use and in dotted lines in the position occupied just after the sliding section is pushed up.

As represented in the drawings, I have shown my invention applied to a bed which, when closed, resembles a bureau or dressing-case, and in which A is the head-board, and B the foot-board.

In the construction shown in my previous patent No. 226,310, April 6, 1880, I employed a foot-board which was pivoted to the side bars of the bed, the foot-board having the legs and the side covering-pieces secured rigidly to it, so that all of these parts could oscillate on the pivot or pivots relatively to the side pieces of the bed. This form of construction I have found to be, under some circumstances, objectionable, and one part of my present invention relates to an improved form of foot-board and legs. In this construction the foot-board proper does not oscillate, but has hinged to it legs *b*, joined together by a cross-bar, *c'*, and these legs are the only pieces at the foot of the bed which oscillate relatively to the side pieces, the foot-board and the covering and bracing plates or blocks always remaining stationary.

c is a segment-brace attached to one of the legs *b* at one end, its opposite end being notched and running through a slotted plate attached to the inner face of one of the rail-sections C, but not shown. Each of these rail-sections C is at one end attached rigidly to the foot-board B, and carries upon its upper face anti-friction wheels *d* and *d'*, (shown in dotted lines in Figs. 7 and 8,) which run in a way or channel, D, formed for their reception upon the inner face of the section E. The sections E are pivoted at *e* to one of the uprights or side pieces F of the head portion of the bed. There are two of these uprights, one upon each side, joined together by a bottom piece, G, as shown in Figs. 1, 2, 3, and 7.

g g is a molding extending around the bottom, and when the bed is closed up the molding in front provides a finished appearance for the bottom part. (See Fig. 4.) I do not wish to be limited to the exact pattern of the molding or paneling shown, as any desired style or pattern may be employed. By an examination of Fig. 4 it will be seen that when the bed is closed the legs *b b* and cross-bar C' constitute an ornamental molding.

f f are plates or blocks carried by the foot-board B, and arranged so that they serve when the bed is open as supporting-brackets for the said rail-sections C C, and when the bed is folded or closed as ornamental moldings for the side pieces, F, as shown in Fig. 4. The upper ends of the uprights or side pieces F of the head portion are so shaped that the said blocks shall fit closely thereto, the outline of these parts *f* being such that they shall be ornamental both when the bed is open and when it is closed. These plates or blocks do not oscillate or rock relatively to the side pieces when the bed is being moved up or down, as has been customary heretofore. They are made stationary relatively to the side pieces, so as to strongly brace them at the ends and so as to prevent the marring of the side pieces

or of the varnish thereon or other finishing material. The outer portion of the bed proper—that is, the part thereof that swings up and down around the pivots *e*—is counterbalanced so that the weight of the bed shall not interfere with a convenient manipulation of it.

In Figs. 1 and 2 is shown the method which I prefer to use in balancing the swinging part of the bed, the weight of the head-board in this construction being utilized to counterbalance part of the weight of the swinging part. The head-board is supported in grooves *a* in the posts F′ or in the side pieces or uprights F. At the lower edge the head-board is loosely or flexibly connected to the bed by means of the link or lever Q, joined at its upper end to the head-board by a pivotal connection, and at the lower end formed with a Y-shaped or open socket to engage with an arm or pin, *q*, carried by the inner end of the bed. To prevent to as great an extent as possible all the friction resulting from the sliding of the head-board up and down, I combine therewith anti-friction rollers q^2, which bear against the bottom or inner face of the grooves *a*, and also rollers *q′*, adapted to engage with the front and rear walls of the grooves, they projecting far enough on either side of the head-board to insure that there shall always be a rolling bearing-surface.

I am aware that anti-friction rollers have been used in the construction of folding beds in ways other than that which I have shown and described, and for other purposes; but I believe myself to be the first to have successfully overcome the serious difficulty which has been experienced heretofore in structures of this sort—namely, the binding or cramping which is produced by sliding the head-board in its support. The devices ordinarily used for connecting the sliding board with the swinging part are more or less inclined relatively to the head-board, and therefore they exert a pressure across the plane of motion which greatly increases the frictional resistance, and this I obviate. The anti-friction rollers q^2, which are at right angles to the plane of the head-board, obviate entirely the resistance which results from the transverse thrust and pull of the connecting devices, and the rollers *q′*, parallel with the plane of the head-board, prevent the binding which there is a tendency to produce by the swaying or sidewise movements of the head-board.

The link or lever Q may be pivotally connected in any suitable way, though I prefer that shown, there being for each lever a supporting ear-piece, R, projecting downwardly somewhat from the head-board and constructed to be screwed or otherwise fastened to the head-board. In a suitable socket in this the lever or link Q is pivoted, as shown at *r*. The weight of the head-board is supplemented preferably by means of springs S, connected at their upper ends to the levers or links Q and at their lower ends to the stationary part of the bed by any suitable devices, as shown at *s*. These springs operate to pull the head-board down so that it and the pivoted links or levers shall always be in proper position for engagement with the swinging part. If there be any cramping or binding of the head-board in its guide-ways, the springs will overcome it and insure its moving down to its lowest position when necessary. However, I do not limit myself to the use of these springs, as under some circumstances they may be omitted without departing essentially from the other parts of my invention. When the bed is in its lowest position, as shown in Fig. 1, the inner end is in engagement with the links or levers Q, and through them the weight of the head-board is bearing downward upon said inner end of the bed, this weight being supplemented by the resistance of the springs S when they are used. Therefore when the outer end of the bed is lifted the lifting action will be assisted by the weight of the head-board and the tension of the springs, as will be readily understood. The downward movement of the links or levers Q is stopped by means of abutments or stops Q^3, which may be arms or pins projecting laterally from the head-board frame, or of any other suitable character.

When the parts are thus constructed and arranged I am enabled to do away with very much of the cumbersome and expensive weighting material which is commonly used to counterbalance the swinging part of the bed. The downward movement of the head-board is stopped before the bed reaches its uppermost position, and at the instant of its stopping it is disengaged from the upwardly-swinging bed. Preferably this disengagement occurs when the bed is at about an angle of forty-five degrees, as shown in full lines in Fig. 2. When the bed is being let down it again engages with the head-board when it reaches the position shown in said figure, and the head-board and springs (when used) begin their work of counterbalancing, this engagement occurring at the time when the downwardly-swinging bed begins to exert the most weight at its outer end. Preferably this engagement between the head-board and the bed and the disengagement occur at the point and by the means shown—that is to say, by means of the Y-shaped or open socket part Q′ on the links or levers Q and the arms or pins *q* carried by the bed. While the bed is swinging downward, and when it reaches the angle shown, the pins or arms *q* pass into the sockets Q′. When the bed is rising it is disengaged from the sockets after it reaches the angle shown in its upward movement, there being but little counterbalancing resistance required at the upper part of its throw.

I am of course aware that sliding head-boards, broadly considered, are old in the construction of folding beds, and also that the head-board has been used as a counterbalancing-weight; but in the folding beds with which I am ac-

quainted the head-boards are permanently in engagement with the swinging parts of the beds—that is to say, both when the bed is in its uppermost position and when in its lowermost. The supplemental weighting material has been heretofore attached to the sliding head-board. This constant engagement between the parts has necessitated a more or less complicated and cumbersome mechanism in order to shift the fulcrum or pivotal line and prevent the swinging of the connecting parts through too large an arc. I avoid all these inconvenient devices by providing the bed and head-board with means for automatically engaging them when the bed is in the lower part of its path and means for automatically disengaging them when it is in the upper part of its path. Pivoted links or levers have been employed to provide a constant engagement of the nature described between the head-board and the folding part; but they have been attached in a way which I have found to be very disadvantageous for many reasons—that is to say, they have been pivotally connected with the head-board at its upper end or near said end. In consequence it has been necessary for them to have a large space at the side of or behind the head-board in which to swing during their movements; and in order to brace and steady the links it has been necessary to divide the head-board into two parts, of which the lower part has been fastened to the links or levers so as to swing with them, while the upper part of the head-board has been left free. I avoid this cumbersome, complicated, and insecure mechanism by combining with the swinging part and the sliding head-board links or levers pivoted at the lower edge of the board and directly thereto.

The advantages attained by detachably connecting the sliding head-board with the swinging part of the bed can also be attained by having the head-board stationary, if desired, and employing a supplemental weight, for it will be seen that it is the weight of the sliding head-board which is effective, so far as this part of the invention is concerned. Therefore I do not wish to be limited to the combination, with the swinging part of a bed, of a sliding head-board which can be automatically connected with the swinging part and automatically detached therefrom when the bed is nearly up, for a supplemental weight can be arranged to be thus automatically connected with and disconnected from the swinging part, so that the counterbalancing-weight shall be effective when the bed is nearly down and be thrown out of action when the bed is nearly up.

The stopping of the downward movement of the head-board may be caused by having the board strike the lower end of the grooves *a*, or by having adjustable pins or other adjustable devices. However, I may employ a weight shaped and connected in a peculiar manner, which I will now describe.

The inner end of each side section E is provided with a bracket or web-supporting piece, *h*, which at its base has laterally-projecting flanges adapted to be secured to the side pieces by means of screws, as shown at *i*, Fig. 5.

I is the counterbalancing-weight, consisting of a bar of cast-iron, preferably rectangular in cross-section, and provided at each end with a central recess adapted to fit over the supporting-web *h*.

I am aware that a similar counter-balance has been supported upon the inner ends of side pieces or rails of a bed by means of socket-pieces, each having two or more flanges adapted to engage with the outer faces of the cast-iron bar; but I find my devices to be much cheaper. I am obliged to use a comparatively expensive grade of cast-iron for the end supporting-pieces; but by employing only a single central web I can support the counter-balance with but a comparatively small amount of metal of this expensive grade. I employ also a lower and cheaper grade of metal for the counter-balance itself, this being rendered possible on account of the thickness in cross-section.

In Figs. 7 and 8 I have shown a form of bed in which the head-board is stationary and the metal weight I is alone relied upon to counterbalance the swinging part; but this construction is under some circumstances inferior to the other, in that the metal weight tends to slam the bed back against the head with too much force. Moreover, more strength is required to start it in pulling it down, especially with heavy beds, whereas with the construction shown in Figs. 1 and 2 the counterbalancing resistance is decreased when the bed reaches the angle shown in Fig. 2, the decrease being great enough to prevent both slamming and also too great resistance in starting the bed down.

I prefer to line the inner edges of the channels *a* with metal strips to engage with the peripheries of the anti-friction wheels *d d'*.

In order to properly support the bed-springs and mattress, and at the same time to permit the desired movement of the side rail-sections, C E, relatively to each other, and also provide a stop to prevent the sections from being pulled apart, I have devised the following construction:

J J are bars connected at their outer ends to the foot-board B, in any suitable manner, by means of cleats, mortises, and tenons, or otherwise, and at their inner ends to a cross bar or girt, which is in substantially the same plane as bars J. By preference I also employ braces L L, extending from the foot-board to the cross bar or girt K; but these braces may be dispensed with.

m m are bolster-blocks attached to the bottom of paneling H.

M M are bars, each having one end supported upon one of the bolster-blocks *m* and its other end supported upon a block or rail, N, resting upon the opposite end of the paneling

or bottom. It will be seen that these bolster-blocks serve not only as supports for the ends of the bars H, but also as stops with which the cross-bars K engage to prevent the side rail-sections from being drawn apart.

O O are spring-supporting bars connected with the under sides of bars M at such distance from the paneling or bottom H as will permit the cross-bar K to slide freely backward and forward.

P P are the spring-supports upon the upper faces of bars J, adapted to receive and support the mattress-springs.

I am aware that chairs or sofas have heretofore been made with a stationary section supported upon four or more legs and a sliding section, with a single rolling pivot interposed between the two sections on each side of the chair or sofa, so that when the sections have been closed up one could be rocked or swung up and down relatively to the other about said rolling pivot, and I do not claim such construction as my invention. The anti-friction rollers *d d'* in my case not only are not used pivotally, but, moreover, must not be allowed to so act, as there would be no vertical support between the rail-sections. I provide a strong support by arranging two rollers on each side in the manner described, so that each prevents the parts from oscillating about the other roller, whereby the overlapping ends of the rail-sections are held up firmly, but not interfered with in their movements. The rollers *per se* decrease the friction when the sliding section is being pushed up; but, so far as providing support for the overlapping ends of the rail-sections is concerned, they are of the nature of lateral projections secured to one rail-section and engaging with the other to furnish support, as aforesaid.

In practice I usually prefer to attach these bars to their respective springs, the spring-bottom being so constructed as to fold up at or near the line of the bolster-blocks *m m*, to facilitate the folding of the bed.

The positions of the mattress and spring-bottom when they are in the place for use are shown in full lines in Fig. 9, and in dotted lines are shown the positions of the lower part of the mattress and of the spring-bottom after they have been turned over and just before the sliding section has been moved up. The springs are represented by O', the jointed slats at the top by P', and the mattress by P^2.

The construction and arrangement of the parts which permit the longitudinal expansion and contraction of the swinging part of the bed are much superior to those that have heretofore been employed. It has been common in making beds capable of such expansion and contraction to provide a vertical support from the floor below the overlapping ends of the roller-sections, so that after the bed is extended there shall not be any sagging. The use of such devices for preventing sagging at this point prevents folding the bed up in small space and mars the neatness of appearance. In a few instances it has been attempted to support the sliding rail-sections upon the hinged section by means of a third bar interposed between the two others, there being a tongue-and-groove connection provided for the parts. This also makes a very cumbrous structure, and when it has been used has prevented the neatly concealing of the slats and spring-frame. By arranging the outer part of the swinging portion of the bed so that it can be moved up nearly to the counterbalancing-weight before the bed is swung up to close it, I can very materially decrease the amount of the counterbalancing-weight. To get the best results in this respect I prefer to hinge the sections E E at a point considerably in front of their rear ends, as shown, and to apply the counterbalancing-weight I at or near said ends.

What I claim is—

1. In a folding bed, the combination, with the vertically-swinging part and the vertically-sliding head-board connected thereto, of the anti-friction rollers, arranged, substantially as set forth, in proximity to the head-board, to provide a rolling bearing-surface therefor, whereby it is prevented from binding in its guide, as described.

2. In a folding bed, the combination, with the swinging part, the sliding head-board connected therewith, and the head-board frame provided with grooves for the head-board, of anti-friction rollers situated in said grooves parallel with the head-board, and other anti-friction rollers at right angles to the plane of the head-board, whereby the head-board is prevented from binding either at its edges or upon its faces in its guide, substantially as set forth.

3. In a folding bed, the combination, with the swinging part and the sliding head-board, of the intermediate links or levers united directly to the lower edge of the head-board by pivots and adapted to be connected with the swinging part of the bed, substantially as set forth.

4. In a folding bed, the combination, with the swinging bed and the sliding head-board, of the links or levers connected to said head-board and adapted to be detachably connected automatically to the swinging bed, substantially as set forth.

5. In a folding bed, the combination, with the swinging bed provided with pins or arms at the inner end and a sliding head-board, of the intermediate links or levers connected to the head-board and provided with open sockets adapted to be detachably engaged with the pins or arms on the swinging bed, and means for automatically detaching said pins from said links or levers, substantially as set forth.

6. In a folding bed, the combination, with the swinging part and a counterbalancing-weight adapted to be attached to and detached from the swinging part, of means, substantially such described, for automatically engaging said counterbalancing-weight with the swinging

part when the latter is moving through the lower part of its path, and means, substantially such as described, for automatically disengaging the weight from the swinging part when the latter is in the upper part of its path.

7. In a folding bed, the combination of the swinging part, the sliding head-board, the intermediate connecting devices, means, substantially such as set forth, for automatically disengaging the head-board from the swinging part, and stops arranged, substantially as set forth, to prevent the downward movement of the head-board before the swinging part of the bed has reached its uppermost position.

8. In a folding bed, the combination of the swinging part, the sliding head-board, means, substantially such as described, for automatically engaging the sliding head-board with the swinging part of the bed, springs arranged as set forth to draw the head-board downward, and means, substantially such as set forth, for automatically disengaging said springs and the sliding head-board from the swinging part of the bed.

9. In a folding bed, the combination of the swinging part provided with a constant weight, I, at its inner end, another separate detachable weight, means, substantially such as set forth, to engage said detachable weight with the swinging part of the bed when the latter is traveling through the lower part of its path, and means, substantially such as set forth, for disengaging said separate detachable weight from the bed when it is in the upper part of its path.

10. In a folding bed, the combination, with the swinging bed, provided with a constant weight at its inner end, of the sliding head-board and intermediate devices which connect the head-board with the bed while the latter is traveling through the lower part of its path, and which are disconnected from the bed when it is in the upper part of its path, substantially as set forth.

11. The combination, with the counter-balance having its ends recessed, of the supporting-brackets, each provided with a single central web, substantially as set forth.

12. In a folding bed, the combination, with the sliding sections, of the cross-rail K, connected to the foot-board, and the bolster-blocks *m*, connected with the bottom or panel portion, H, substantially as set forth.

13. In a folding bed, the combination, with the sliding rail-sections, of the bolster-blocks *m*, attached to the panel or bottom H, the bars J, cross-bar K, and the supporting-bars M M, having the spring-supporting bars connected therewith, substantially as set forth.

14. In a folding bed, the combination, with the inner side rails, E E, the outer rails, C C, the foot-board, and the uprights F, of the plates or blocks *f f*, secured stationarily relatively to the side pieces C C of the swinging part, and arranged to brace said side pieces and foot-board and to overlap the ends of the uprights F, substantially as set forth.

15. In a folding bed, the combination of the side rail-sections C C, the foot-board A, secured rigidly to said rail-sections, the legs *b b*, united to the foot-board by a hinge-connection, and the segment-brace *c*, for holding the legs firmly relatively to the swinging part and the foot-board, substantially as set forth.

16. In a folding bed, the combination, with the side rail-section E, having a groove or way in its inner face, and the sliding rail-section C, of the inner roller, *d*, and the outer roller, *d'*, both situated on the same side of the bed and interposed between the two rail-sections, each roller being arranged, as set forth, to prevent the rail-sections from rocking about the other roller, substantially as set forth.

17. In a folding bed, the combination, with the head frame or casing F F, of rail-sections E E, hinged to said frame or casing, the sliding rail-sections C C, the rollers *d d'* interposed between the overlapping ends of said rail-sections E and C, and arranged to support said overlapping ends vertically, said rail-sections E and C being constructed to cover and conceal the slats and spring-supports, whereby the swinging part of the bed is capable of longitudinal expansion and contraction, and turning bodily up or down upon its hinge without exposing laterally any of the interior parts of said swinging portion and without necessitating a support from the floor for the overlapping ends of the sections, substantially as set forth.

18. In a folding bed, the combination, with the head frame or casing F F, of the rail-sections E E, hinged to said frame or casing, the counterbalancing-weight applied to said sections inside of the line of hinging, and the sliding rail-sections C C, arranged, substantially as set forth, to be moved up nearer to said counterbalancing-weight before the bed is turned up, whereby the swinging portion of the bed can be counterbalanced by a decreased weight.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY S. HALE.

Witnesses:
J. WARREN HALE,
OWEN D. ROBERTS.