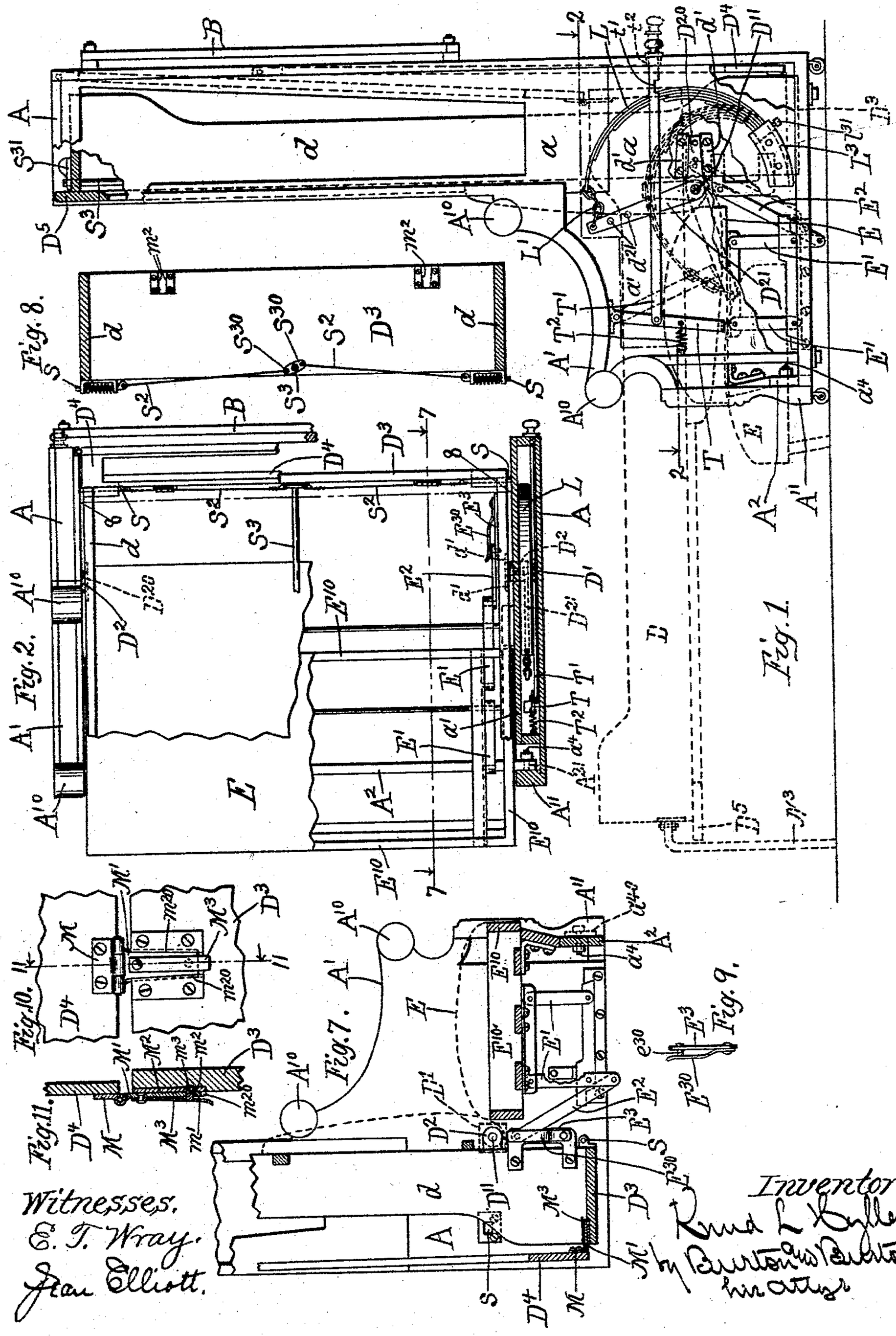
(No Model.) 2 Sheets—Sheet 1.

K. L. HYLLER.

FOLDING BED.

No. 515,686. Patented Feb. 27, 1894.



Witnesses.
E. T. Wray.
Jean Elliott.

Inventor.
Knud L. Hyller
by Burton & Burton
his Attys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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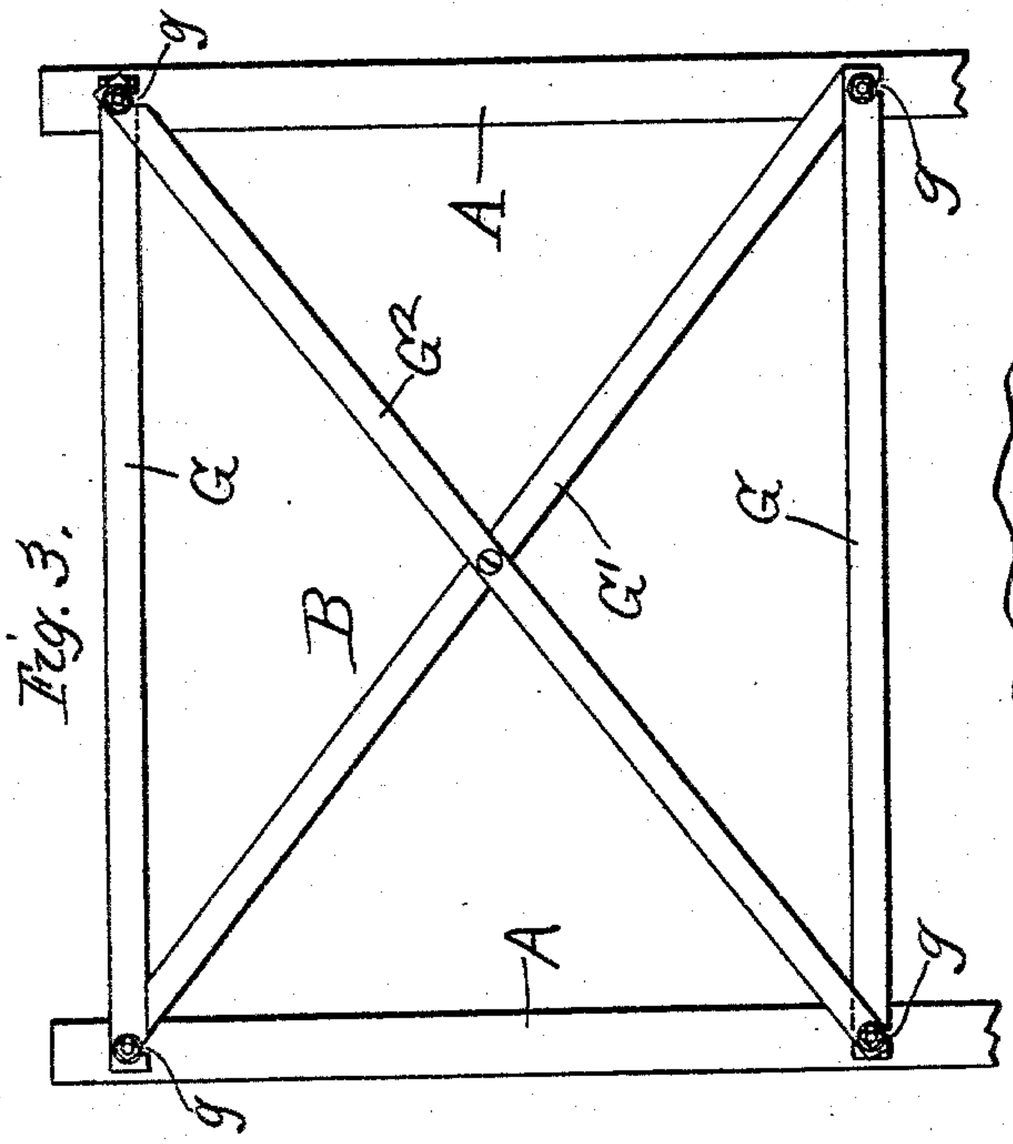

Fig. 3.

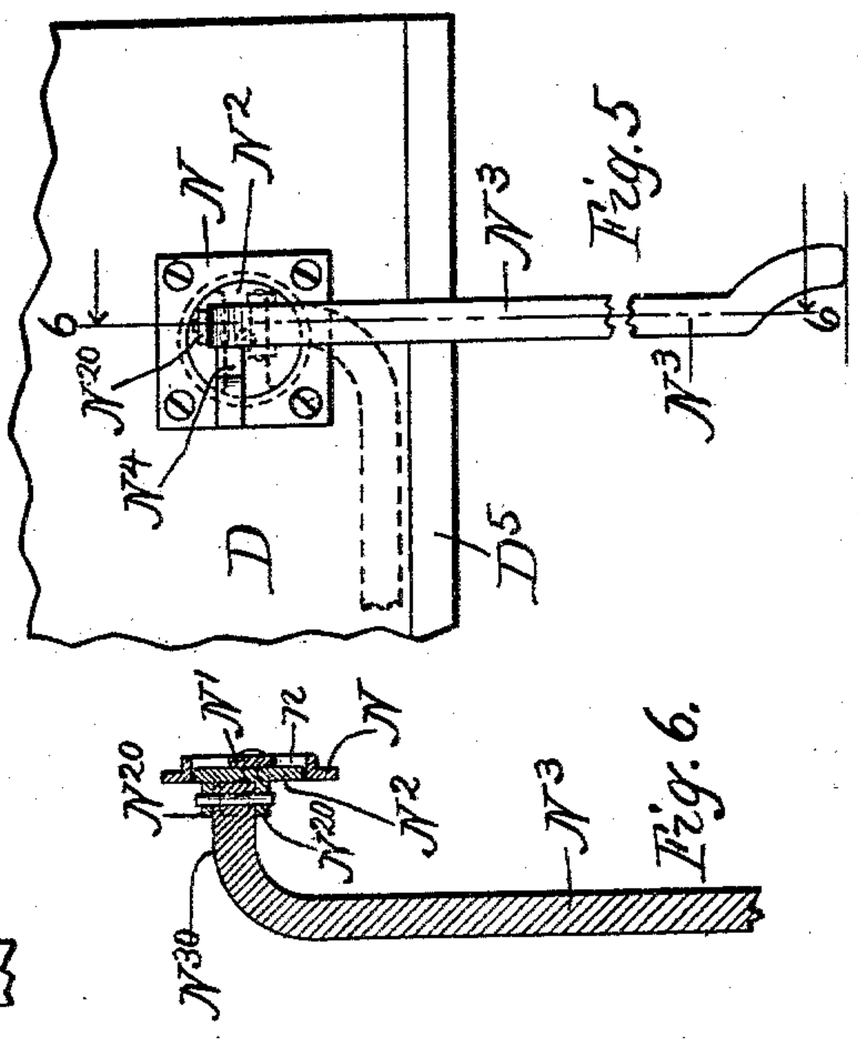

Fig. 5.

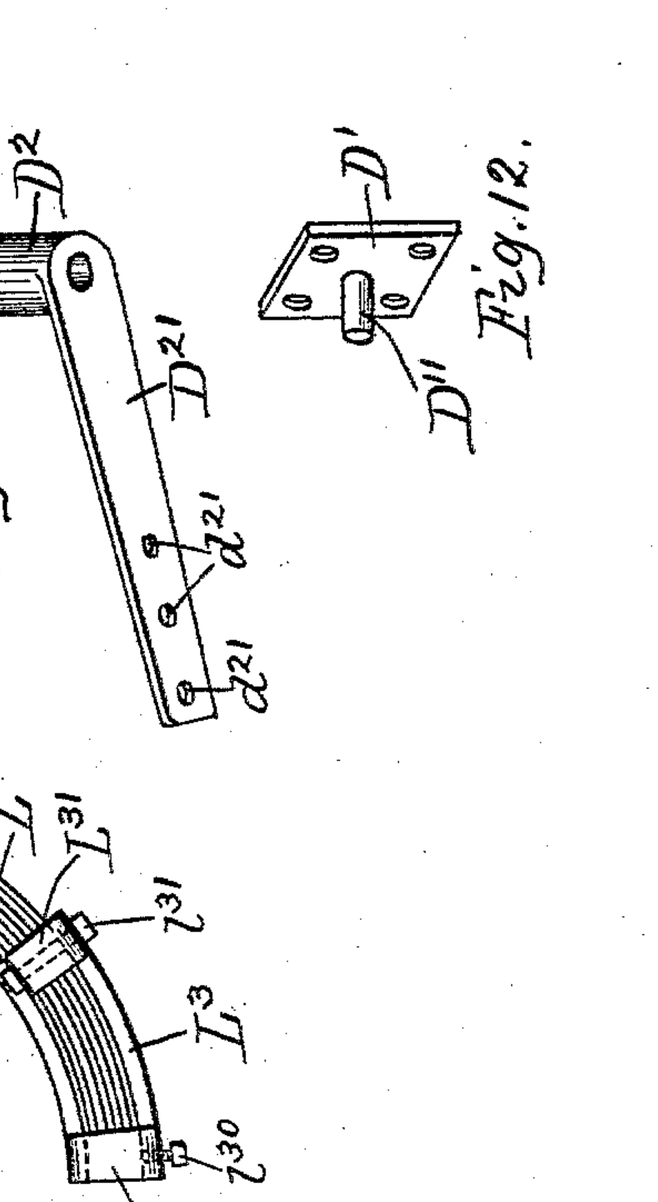

Fig. 6.

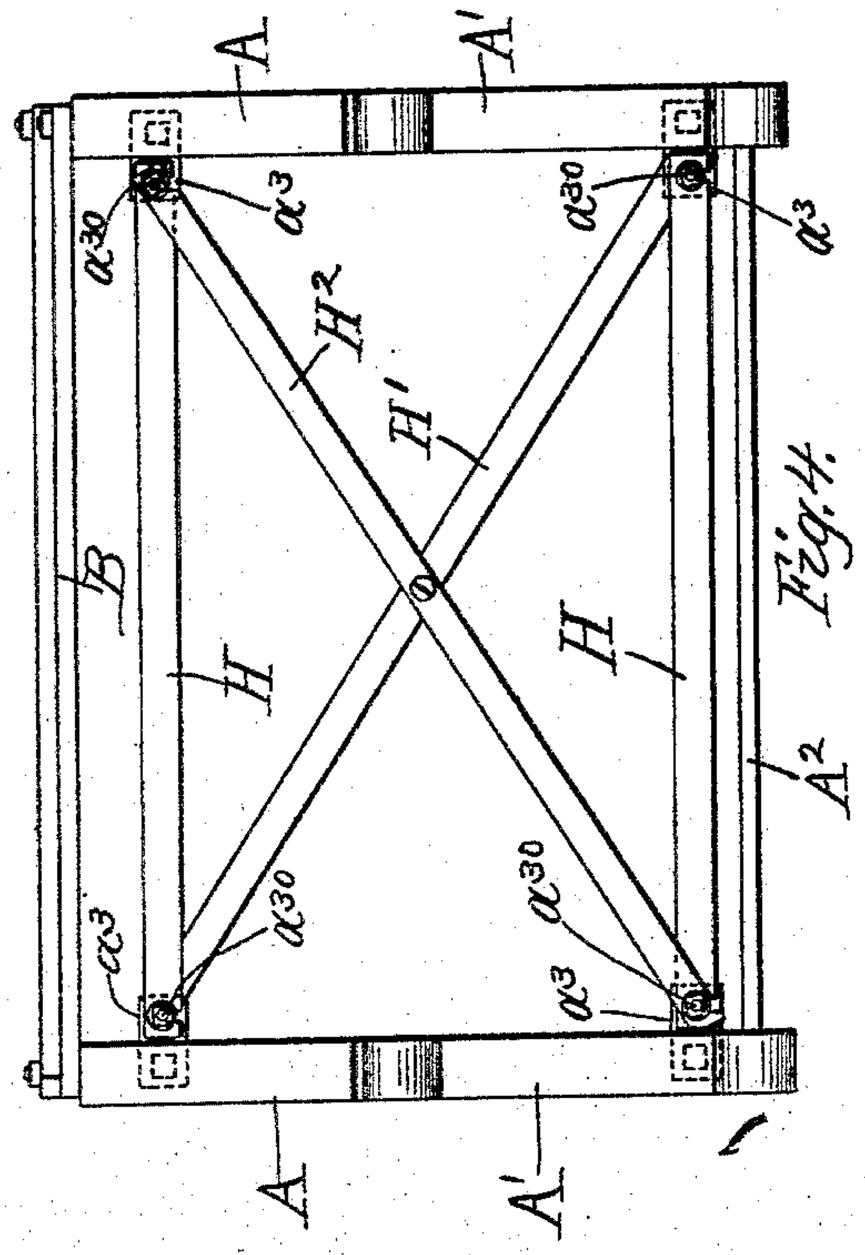

Fig. 4.

Fig. 13.

Fig. 12.

Fig. 14.

Witnesses.
E. T. Wray.
Jean Elliott.

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Knud L. Hyller
by Burton & Burton
his attys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

KNUD L. HYLLER, OF CHICAGO, ILLINOIS.

FOLDING BED.

SPECIFICATION forming part of Letters Patent No. 515,686, dated February 27, 1894.

Application filed July 31, 1893. Serial No. 481,931. (No model.)

To all whom it may concern:

Be it known that I, KNUD L. HYLLER, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Folding Beds, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

This invention belongs to the class of beds which tilt from vertical to a horizontal position upon a fixed upright frame at the head, and it comprises, in combination with the devices specifically pertaining to such a bed, a sofa which, when the bed is folded up, occupies a position in front of it, and when the bed is horizontal is depressed and occupies a position under the bed, but in neither position forms any part of the bed proper, but is merely operated by the tilting movement of the bed.

In the drawings,—Figure 1 is a side elevation with the outer cheek or inclosing board of the upright frame removed, and certain other interior linings broken away in part to show the interior mechanism. The parts are shown in full lines with the bed folded up and in dotted line with the bed horizontal. Fig. 2 is a plan showing the bed horizontal, but chiefly broken away and being partly sectional at the plane indicated by the line 2—2 on Fig. 1. Fig. 3 is a detail rear elevation of the upright frame. Fig. 4 is a plan of the upright frame. Fig. 5 is a detail elevation of a pivoted leg which I employ for the foot of the bed when it is horizontal, the full lines showing it in the position of use and the dotted lines showing it folded up as when the bed is elevated. Fig. 6 is a detail section at 6—6 on Fig. 5. Fig. 7 is a section at the line 7—7 on Fig. 2. Fig. 8 is a section at the line 8—8 on Fig. 7. Fig. 9 is a detail elevation of the bracket or clip which affords disengageable pivotal connection for a link by which the bed controls the movement of the seat. Fig. 10 is a detail elevation showing a special form of hinge connecting the bed frame and sliding head frame. Fig. 11 is a section at the line 11—11 on Fig. 10. Fig. 12 is a perspective of a stud plate for pivoting the bed frame to the upright frame. Fig. 13 is a perspective of the bell-crank-lever by which the pivoted bed frame is operated. Fig. 14 is a detail elevation of a clip for securing the leaves of the bent counterpoising spring, showing the stub ends of the springs in place.

I will first describe, in general outline, the structure employed in my invention.

The upright frame, into which the bed folds up, comprises two side cheeks A A, and suitable brace frames B and C which connect the side cheeks, the former frame at the back, and the latter frame at the bottom. The details of the construction of these frames and their connections to the cheeks are designed with special reference to affording facility in assembling the parts and disconnecting for shipment, or to permit moving the bed readily from one position to another, which would otherwise be attended with much difficulty on account of the total dimensions being too great to allow it to pass, either when folded up or extended, through dwelling-house doors of ordinary dimensions. The bed frame D, which is a rigid and substantially rectangular frame of ordinary dimensions, is pivoted near the head end to the two cheeks near the lower end of the latter, and adapted to swing to an upright position between the cheeks or to a horizontal position extending from them. The connections between the bed frame and the upright frame, in addition to the pivots referred to, consists of springs attached to the upright frame and operating upon the bed frame, tending to counterpoise the weight of the latter when it is prostrate.

The sofa seat E occupies a position in front of the bed when the latter is folded up, and in that position it is supported by parallel links at both ends, which connect it to the cheeks of the upright frame and is retained in proper position by links which connect it also to the lower end of the bed frame, and which, when the bed is swung down, operate to depress it out of the way of the bed and into position under the latter. The forward extension A′ of cheeks of the upright frame are fashioned at the upper part to form arms for the sofa when the bed is tilted up, and to give an ornamental finish to the head ends of the side-boards of the bed frame when the bed is horizontal.

The cheeks A A are designed to be made

in any suitable style of cabinet work, comprising the arm portions A′ A′, which are suitably finished with the arm rolls A^{10} A^{10} whose width covers the box or cavity contained in the cheek under the arm, within which much of the operating mechanism is concealed and protected; and for uniformity, as well as to produce a handsome appearance and to permit upholstering or other fancy finishing to the inside of the cheeks above the level of the bed when prostrate, the lining or inner sheeting a' of the arm is made continuous with the lining or inner sheeting a of the upwardly extending portions of the cheeks; but said lining or inner sheeting a I prefer to make in the form of a mere skeleton, as illustrated, with a central opening which may be occupied by an ornamental panel or upholstering or drapery. The upper portion of the lining a' of the arm is designed to be covered with upholstering. The two cheeks comprising the arms are secured together by two frames, one at the back and the other at the bottom. These frames are similar in construction which is designed to afford rigidity with the least possible weight, and to adapt them to serve as means for connecting the two cheeks rigidly together in such manner that they may be easily detachable for shipping and easily assembled in setting up the bed. The back frame comprises upper and lower horizontal bars G G, connected by a diagonal bar G′, making a Z-shaped frame of metal, the three bars being in one plane and being rigidly secured together or made integral. A second diagonal bar G^2 connects the otherwise unconnected ends of the bars G G, and is also rigidly connected to said bars and to the other diagonal bar at its intersection therewith. These bars may be covered with wooden bars, the metal serving to afford tenacity against distortion of the frame at the junctions and angles, and the wood giving stiffness to prevent bending. At the four corners of this frame are formed four downwardly open notches g g g g, &c., made in the lower edges of the horizontal bars; and to the cheeks, at the back edges, are secured in proper positions four angle lugs a^2 a^2 a^2 a^2, through which bolts extend, on which the back frame may be hung, the bolts entering the notches described, and the nuts on the bolts being then tightened up and binding said back frame firmly to the cheeks and holding the cheeks rigidly in proper relation. The bottom frame is made of bars H H H′ and H^2, framed similarly to the bars G G G′ and G^2, and similarly notched, and to the lower ends of the cheeks are secured lugs a^3 provided with bolts a^{30}, which are adapted to enter the notches in the bars H, and be secured by tightening the nuts in the same manner, as above described. By this means, the mere slacking of the nuts without removing any of them or permitting the escape of the bolts permits the easy detaching of the parts, and leaves no loose parts, as nuts or bolts, to be taken care of or liable to be easily lost during handling or shipping. A similar expedient is employed to secure the front sill A^2 to the forward edge of the cheeks at the lower ends, bolts a^4 having their heads secured behind metal plates a^{40}, which are fastened upon the back surface of the molding or pilaster A^{11}, which finishes the forward edge of the arms, and being adapted to enter downwardly open notches A^{21} near the ends of the sill; a washer and nut on the threaded end of the bolt serving to bind the sill thus firmly in place and adapt it to be disconnected upon the mere slacking of the nut without the removal of the latter.

For the purpose of pivoting the bed frame D to the cheeks I provide stud plates D′ D′, secured to the cheeks upon the inner sides. The bell-crank-levers D^2 D^2 are fulcrumed at their angles upon the studs D^{11} D^{11}, which project from stud plates, and to the side-bars d, d, of the bed frame are secured plates d' d', which constitute guards between which the arms D^{20} D^{20} of the bell-crank-levers D^2 are adapted to be engaged, the edges of said arms D^{20} being beveled and engaged under the beveled edges of the plates d' d', said edges converging, and the arms D^{20} being tapering to correspond to such convergence, so that said arms, when inserted between the plates and under their edges may be forced into secure engagement therewith. To the cheeks A A are secured also, on the inner side, the leaf springs L L, the lower ends of said springs being made fast, and the springs extending up back of the pivots of the bed to the cheeks, and being connected at their upper ends by chains L′ L′ to the ends of the longer arms D^{21} D^{21} of the bell-crank-levers. Said arms D^{21} are provided with several holes d^{21} at any one of which, on each lever, the chain which connects that lever with its spring may be attached to vary, as may be necessary, the tension of the spring in the operation of the bed or at the limit of its downward movement, according to the weight of the bed which it is the purpose of the spring to merely counterpoise when the bed is at its horizontal position. For the purpose of securing the several leaves of these springs in convenient form for use as shown, I provide the casting L^3, having, springing from its web at the lower end, a rectangular loop L^{30}, in which the ends of the leaves may be inserted, and any number, up to the total capacity of the loop, may be bound fast by the bolt l^{30}. From the same side of the web, at the other end, the angle hook L^{31} projects, in position to permit the leaves to be lodged under it, and a bolt l^{31} is there inserted through the leaves and into the stem of the hook, whereby any number of leaves may be bound rigidly thereto, giving the leaves two rigid points of fastening to the casting, which is adapted to be fastened by screws onto the cheek after the desired number of leaves for the spring are thus secured to it. The two arms D^{20} and D^{21} of the

bell-crank-lever are not in the same plane, the arm D^{20} being outside of the lining *a* of the cheek, while the arm D^{21} is inside of the lining; and this permits the spring and chain also to be inside the lining between the same and the outer cheek, only the arm D^{20}, to which the side-bars of the bed frame are secured, as described, being exposed outside the lining.

To the upper edge of the head-board D^3 of the bed frame, there is hinged the back screen or panel or curtain frame D^4, which is designed to close up the upright frame at the back, concealing the frame B, by which the cheeks are secured together at the back, when the bed is horizontal. The upper end of this panel or curtain frame is guided by means of studs projecting from it into channels provided on the cheeks, so that while the bed is horizontal this curtain frame is at its highest point and is substantially vertical, and closes up the rear space between the cheeks. Preferably, I make this an open frame, which may be filled in the center with an ornamental panel or curtain or upholstery, according to the preference of the user, and to correspond with the panels in the upper portion of the lining *a* of the cheeks. For convenience in assembling and disassembling the parts, I employ a peculiar form of hinge to attach this curtain frame to the head-board of the bed frame. The hinge proper has one leaf M, adapted to be secured in any ordinary manner by screws to the curtain frame, and the other leaf, consisting of a tapering tongue M′ with its converging edges beveled; and I provide a plate M^2 having for the tongue a seat or tapering socket bounded by converging flanges m^{20}, under-cut to correspond with the beveled edges of the leaf M′, and adapted thereby to receive the tapering leaf when entered longitudinally, and give it accurate position when it is forced in snugly between the flanges. For the purpose of securing it against longitudinal displacement,—other displacement being impossible in view of the form of the parts described,—I secure to the outer surface of the leaf M′, a flat spring M^3, having at its free end a rigid stud m^3 adapted to project through a hole *m*′, which is drilled in the leaf M′, and into a corresponding hole m^2 drilled in the plate M^2. When the leaf M′ is forced into the plate M^2, the stud m^3, which normally protrudes through the leaf, is forced back, flexing slightly the spring M^3, and holding it flexed until the leaf M′ has been moved to its final position in the plate, at which point the stud m^3 will coincide with and will be forced by the spring to enter the hole m^2 in the plate, and will, in that position, prevent the endwise withdrawal of the hinge from the plate. But when the spring is lifted to disengage the spring from the plate, the hinge may be withdrawn. This construction avoids removing and replacing screws in taking down and setting up the bed, and insures the proper position of the parts being thus obtained, the bed having been once properly constructed with the plates in the right position, and avoids the annoying loss of the screws and the attempt to use screws of improper size, &c.

The legs which support the foot of the bed when it is in horizontal position being necessarily at the top when it is upright, are most desirably arranged so as to be concealed from view in the latter position, since it is difficult to devise suitable legs which will constitute an ornament at the head-piece or cornice of the entire piece of furniture when the bed is upright. I provide, therefore, a finishing lip or cornice D^5, projecting from the foot-board of the bed frame, horizontally when the bed is down, and vertically when the bed is up, behind which, when the bed is up, the legs may be concealed; and I construct a leg which will now be described adapted to be concealed behind this lip, and at the same time adapted to project over it when it is swung into operative position.

N is a plate let into the face of the foot-board and flush therewith and secured thereto, and having a circular opening *n* flanged at the back and crossed at the center by a bar N′.

N^2 is a circular disk, adapted to enter the opening *n*, and pivoted to the cross-bar N′ at the center of said opening and of the disk. From the forward face of the disk N^2 there projects a lug N^{20}, which stands a little aside from and above the center of the disk,—referring to its position when the leg is in operating position,—and to this lug is pivoted the leg N^3. The leg has its upper end bent to extend horizontally,—referring to the leg in its position in use,—such distance as may be necessary to reach past the finishing lip or molding D^5, and its pivot to the lug N^{20} is parallel with the extent of the leg proper, and at right angles substantially to the horizontally bent portion N^{30}.

N^4 is a rigid finger or lug which projects from the forward face of the plate N over the circular opening *n* to a point where it will constitute a stop to arrest the lug when the plate is rotated to bring the leg vertical. The plate being rotated to carry the lug away from this stop,—that is, downward to the position shown in the drawings, the leg, whose pivot is then horizontal, may be swung on that pivot and lodged flat against the foot-board where it will be entirely concealed behind the finishing lip D^5, when the bed is upright.

It will be observed that when the bed is down and the leg in operative position, the presence of the lip D^5 prevents turning the leg on its pivot, and it can only be displaced by swinging it about the axis of the disk, and that it is stopped by the finger or lug N^4 against so swinging in one direction, and to swing in the other direction would carry the foot of the lug downward, which would lift the bed from the floor. The weight of the bed will therefore tend to resist the only dis-

placement of the lug which is possible,—to-wit, that which might be caused by dragging the foot of the bed sidewise on the floor in one direction, and the toe or bearing point of the leg on the floor may be set aside to any extent to increase the tendency of the bed's weight to resist displacement of the leg. These fixtures will be made rights and lefts, and secured to the bed so that the legs must swing inward,—that is, toward each other, the stop operating to prevent them swinging outward.

The frame E^{10} of the sofa E is connected by parallel links E′ E′, two at each end, to the cheeks A A of the upright frame, and in the position at which the bed is upright, these links are also upright and hold the sofa seat in position such that the forward bar of its frame rests upon the upper edge of the sill A^2. In this position, a link E^2 at each end connects the seat frame to the lower end of the bed frame. This connection may be made by connecting one end of the link E^2 to the rear link E′ below the pivot of the latter to the upright frame, the other end being connected to a suitable bracket secured to the lower end of the bed frame. For convenience of attaching and detaching, I employ, as a means of connecting the link to the bed frame, a clip E^3, having riveted to it a flat spring E^{30}, at the free end of which there is a rigid stud e^{30}, which is adapted to project through the eye of the link E^2, and into a hole formed in the clip, and thereby constitute the pivot for that end of the link, from which, however, the link may be readily disengaged by flexing the spring to withdraw the stud from the eye of the link. The proportions of the parallel links E′ and the link E^2, and the location of the several pivots, is such that when the bed swings down the seat is pushed forward and swinging upon the parallel links which support it, moves downward also while it moves forward, so that when the bed is in horizontal position the seat is sufficiently depressed to stand freely below it, and as the bed is swung upright, it, by a counter movement by means of the links E^2, lifts the seat again to its position of use.

For the purpose of locking the bed securely in horizontal position, so that the tension of the springs, if it should be made too great, can by no means lift the bed, even though all the bedding should be removed to lighten it, I provide two spring-actuated bolts S S, suitably seated in the side-bars *d d* of the bed-frame near the lower end of said frame, adapted to shoot outward into sockets *s s* on the inner side of the cheek linings. To operate these bolts to withdraw them from the sockets, I connect them by links S^2 S^2 to the lever arms S^{30} S^{30} of a rod S^3, which extends lengthwise of the bed at about the middle of its width on the under or forward side, and projects through the foot-board and terminates in a handle S^{31} by which it may be turned to cause its lever arms to draw on the links and withdraw the bolts when it is desired to disengage them and permit the bed to be swung up. It will be understood that the bolts are constructed in the usual manner so that they spring into their sockets without any action of the operator when the bed becomes horizontal.

It will be observed that the arms D^{20} of the bell-crank-lever D^2 extend in such position that the bed frame can be engaged with and disengaged from them most readily while the bed is horizontal, and that then, the bell-crank-levers are under the full tension of the springs, and that these circumstances would tend to make it difficult to effect such engagement and disengagement, because, to effect the engagement it will be necessary to hold both the levers by hand in the right position at the same time against the tension of the springs, which would require the assistance of two persons beside the one who might be handling the bed frame, and that, if disengaged forcibly in that position, the levers will be thrown violently by the springs, and might cause damage to the furniture. To overcome this difficulty and render it easy at any time to disengage the bed from the upright frame, I provide the latches T T, which are pivoted on the inner side of the arm portions A′ of the side-cheeks A near the upper ends of said arm portions, and hang down alongside the cheeks in the plane of oscillation of the lever arms D^{21}, and beyond the ends of said arms, these latches being of such length that, by being swung back, they may pass above the ends of the arms D^{21} when the latter are at their lowest position,—that is, when the bed is horizontal; and in order to give the latches this movement, I connect to them the links T′ T′, which extend back close along the inner surface of the cheeks and out beyond them at the back of the upright frame where they are provided with suitable handles. To prevent undesired engagement of the latches with the lever arm, springs T^2 may be connected to them and to the cheeks, tending to hold them forward of the arms D^{21}, except when they are pulled backward by the links T′; and in order to lock them at their rearward position where they may be engaged above the ends of the lever arms D^{21}, the links T′ may be notched at *t′*, and a pin t^2 provided at the back of the upright frame with which the notches may be engaged. By operating these latches, the lever arms D^{21} may be locked in position which will permit the easy disengagement of the bed frame from the arms D^{20}, and the same expedient will hold said lever arms D^{20} in proper position for easy engagement when the bed frame is to be replaced.

I claim—

1. In combination with the fixed upright frame, the bed pivoted thereto at the lower part and adapted to swing from upright to

prostrate position about its pivot; a seat, and links by which it is supported on the upright frame in front of the bed when the latter is upright, and links connecting the seat to the tilting bed frame to cause the downward movement of the latter to depress the former: substantially as set forth.

2. In combination with the upright frame, the bed frame pivotally connected thereto at the lower part of each and adapted to tilt over such pivotal connection from upright to prostrate position, the seat and links extending downward therefrom to the upright frame, and a link at each side of the bed extending therefrom to one of the links at the same side which connects the seat to the upright frame; whereby the tilting of the bed correspondingly actuates the seat to depress it when the bed is swung down and elevate it when the bed is swung up: substantially as set forth.

3. In combination with the upright frame and the bed frame pivoted thereto at the lower end and adapted to swing from upright to prostrate position; the seat linked to the upright frame and to the tilting bed frame, whereby it is adapted to be held in operative position as a seat in front of the bed frame when the latter is upright, the back of such seat being secured to the under or forward side of the bed frame at the lower part: substantially as set forth.

4. In combination with the fixed upright frame, the pivot studs secured to the cheeks thereon, and the bell-crank-levers fulcrumed on such studs respectively; the springs secured to the cheeks and connected to the bell-crank-levers respectively at one arm of the latter, and the bed frame attached to the other arm of said levers: substantially as set forth.

5. In combination with the foot-board and the lip D^5, the disk N^2 pivotally attached to the foot-board; the leg connected to the disk on a pivot parallel to the latter and bent to pass by the lip; and a rigid finger on the foot-board constituting a stop in position to arrest the rotation of the disk in one direction when the leg is in operative position: substantially as set forth.

6. In combination with the bed frame, the plate N secured to the foot-board; the disk N^2 pivoted to the plate and having the lug N^{20}, the leg N^3 connected to the lug on a pivot parallel with the plane of the disk and with the general extent of the leg; the plate N having the finger N^4 projecting in front of the disk in position to arrest the rotation of the plate when the leg is inoperative: substantially as set forth.

7. In combination with the upright frame, the bell-crank-levers pivoted to its cheeks, the bed frame having the sockets by which it is engaged with one arm of each of the bell-crank-levers; springs attached to the upright frame and connected to the other arms of said levers respectively; the springs being under tension and the first-mentioned arms being substantially upright when the bed is horizontal; the latches pivoted to the upright frame and adapted to swing above the arms to which the springs are attached when the bed is horizontal; and links from said latches by which the same may be operated thus to lock the latches: substantially as set forth.

8. In combination with the upright frame, the bed frame pivoted thereto; springs connected to the upright frame and bed frame adapted to counterpoise the weight of the latter; the spring bolts on the bed frame at opposite sides, and the upright frame having sockets in which they are adapted to engage respectively; the rock-shaft extending longitudinally under the bed frame and having lever fingers linked to said bolts respectively said shaft protruding from the foot end of the frame provided with a handle whereby it may be operated to withdraw the bolts: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 21st day of July, 1893.

KNUD L. HYLLER.

Witnesses:

CHAS. S. BURTON,

JEAN ELLIOTT.