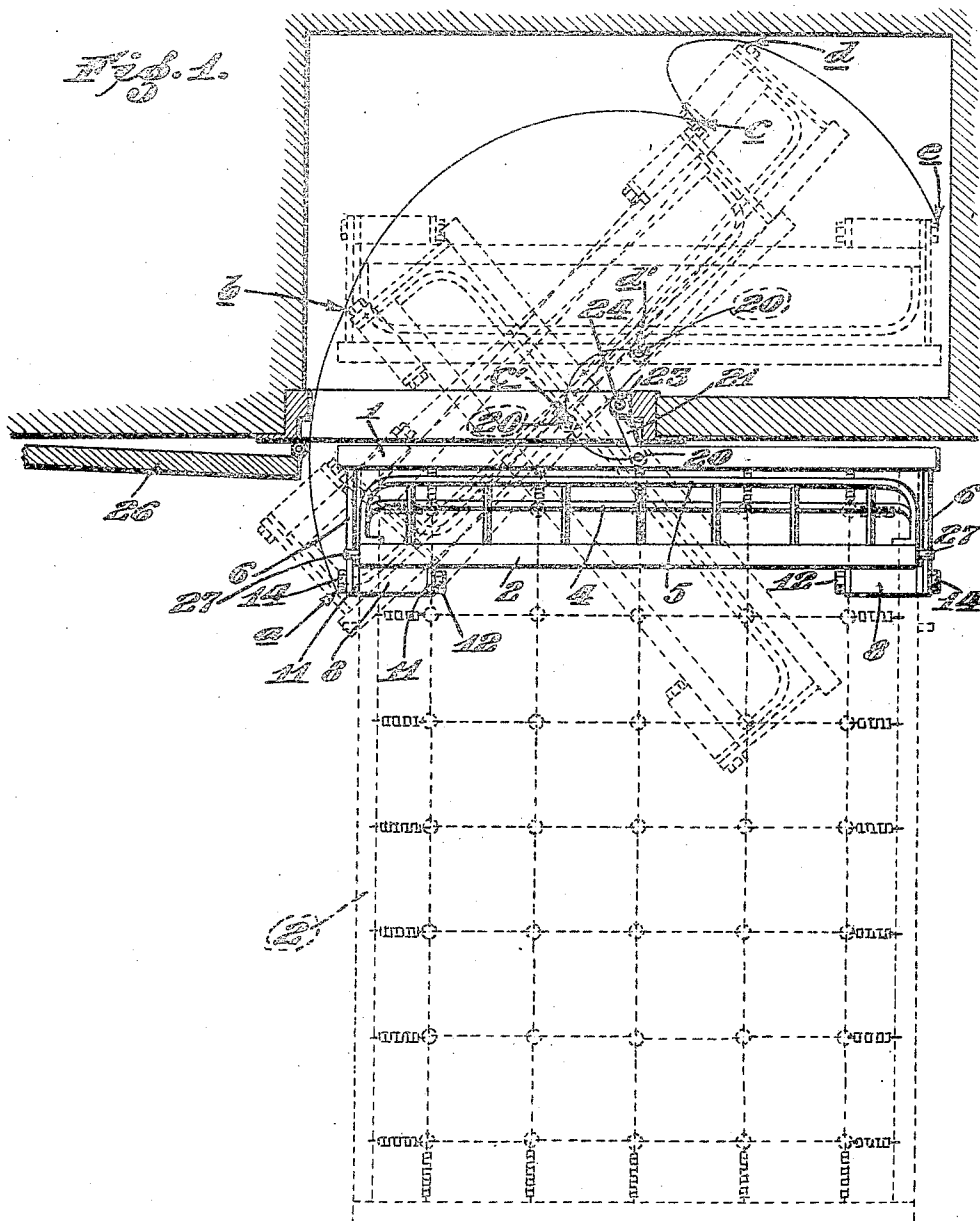


H. U. CRAIN.
HINGE FOR FOLDING BEDS.
APPLICATION FILED JULY 10, 1919.

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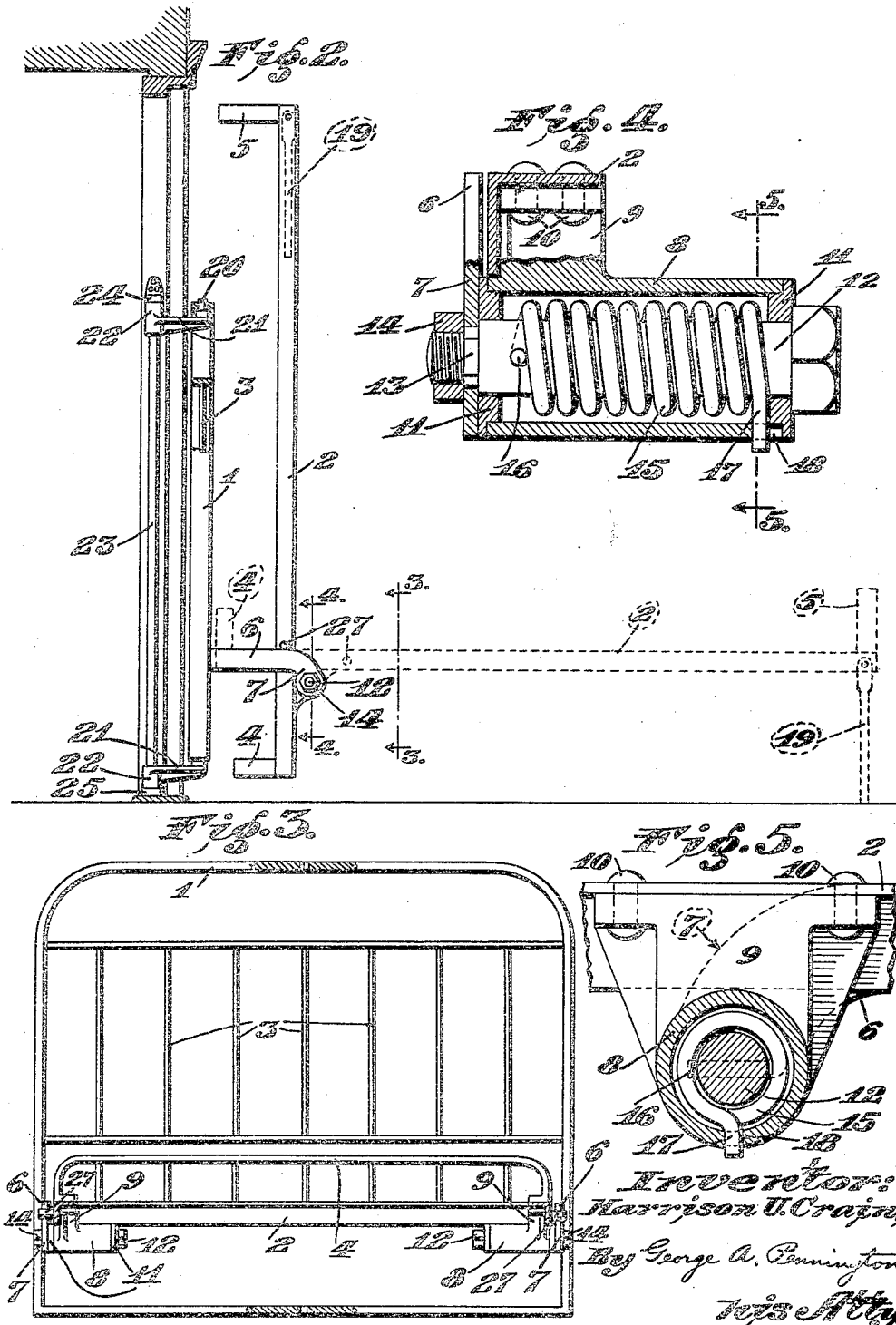
Patented Sept. 12, 1922.
2 SHEETS—SHEET 1.



Inventor:
Harrison U. Crain,
By George A. Pennington,
his Atty.

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UNITED STATES PATENT OFFICE.

HARRISON U. CRAIN, OF ST. LOUIS, MISSOURI.

HINGE FOR FOLDING BEDS.

Application filed July 10, 1919. Serial No. 309,947.

To all whom it may concern:

Be it known that I, HARRISON U. CRAIN, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have
 5 invented a new and useful Improvement in Hinges for Folding Beds, of which the following is a specification.

This invention relates more particularly to closetable folding beds, or in other words,
 10 those of the kind that are capable of being folded up and are hingedly mounted to swing in that condition into and out of a closet through the door opening, whereby it may be placed out of sight when not in use
 15 and readily placed in condition for use as desired.

In all of such structures of this character, of which I am aware, it is necessary to reduce the width of the bed to permit it to
 20 swing in and out through the ordinary standard size doorway, or else to provide an oversize door opening if the bed is made the full standard width of a double bed. So, too, for some structures, it is further necessary to provide an oversize door opening
 25 as to height.

The present invention, therefore, has for its principal object to produce a novel structure which will permit the use of a
 30 minimum standard size door opening. It has for its further objects to produce a simple hinge structure for the bed frame proper which is easily operated and efficient, and to attain certain other advantages as
 35 will hereinafter more fully appear.

In the accompanying drawings illustrating a practical application of the invention,—

Figure 1 is a horizontal section through the closet, and a top plan view of the bed frame in folded up condition in full lines and in position outside of and ready to be swung into the closet, as indicated by the dotted lines, or to permit the lowering of the
 40 mattress frame, as indicated also by dotted lines;

Figure 2 is a vertical section through the closet at the door opening, and showing the mattress frame in raised position outside the closet in full lines, and in lowered position
 50 in dotted lines;

Figure 3 is a view of the swinging sup-

porting frame or carriage of the bed frame detached from the hinge frame and with the mattress frame in lowered position and
 55 shown in cross section on or about the line 3—3 of Figure 2;

Figure 4 is a longitudinal section through one of the counterbalancing hinge joints for the mattress frame, the mattress frame being
 60 in lowered position and the line of section being taken on or about the line 4—4 of Figure 2; and

Figure 5 is a cross section on the line 5—5 of Figure 4.

Referring now to the drawings, the numeral 1 designates a rectangular supporting frame or carriage for the foldable mattress frame 2. As shown, the supporting frame 1 may be provided with suitable
 70 grill work 3 or other suitable members or scrolls to be thereby ornamented and made to simulate the head frame of an ordinary bed structure, while the mattress frame 2 may have head and foot pieces 4, 5, respectively,
 75 to further add to the appearance of the structure as well as to afford abutments to prevent the mattress from slipping endwise on the frame.

Extending horizontally forward from the vertical side members of the supporting frame or carriage 1 are brackets 6 having downturned end portions 7 to which the side rails of the mattress frame are hinged. As shown more clearly in Figures 4 and 5, the
 80 hinges comprise barrels 8 having bracket extensions 9 which are riveted, as at 10, to the side rail members, which latter are of the usual angle iron section. In the ends of the barrels 8 are bushings 11 having central
 85 apertures in which a pivot bolt or stud is rotatably fitted. The bolt or stud 12 has a polygonal shouldered portion 13 fitting a counterpart aperture in the bracket arm 6 so as to prevent it from turning when
 90 engaged therewith, and the bolt or stud is secured in place by a nut 14 on the reduced and screw-threaded outer end portion thereof.

Coiled about the bolt or stud 12 is a
 100 spring 15, one end portion 16 of which is carried through a diametrical aperture in the bolt or stud, while its opposite end portion 17 is projected through a slot 18 in

the barrel 8. The respective springs 15 are coiled in the direction so as to be wound about the bolts or studs 12 as the mattress frame 2 is lowered, and they are preferably adjusted to the capacity of merely counterbalancing the mattress frame with the bedding thereon. That is, just so as to maintain the frame in raised position and to relieve the weight of the outer end portion as the frame is being lowered.

At the outer end of the mattress frame 2 is a hinged foot frame 19 which opens out to support said outer end portion from the floor in its lowered position, while the supporting frame or carriage 1 is afforded a substantial support by the hinge frame now to be described. The frame or carriage 1 is swivelled at the middle of its top and bottom horizontal members on trunnions 20 at the outer ends of horizontally swinging arms 21 whose inner end portions 22 are sleeved upon and secured tightly to a vertical shaft or rod 23 constituting the hinge frame. This shaft or rod has its upper and lower end portions journaled respectively in brackets 24, 25, secured to the door jamb.

The arms 21 being mounted, as they are, to swing together in parallel relation about a common vertical axis, and having the trunnions 20 at their outer ends, a linked or multiple joint folding hinge is produced whereby the supporting frame 1, with the mattress frame 2 in raised position thereon, is capable of being swung into the closet through a relatively narrower door opening than if the hinge arms were rigidly attached to said supporting frame 1.

Assuming the bed to be in position outside the closet as shown by the full lines in Figure 1, substantially four distinct movements or manipulations, as indicated by the dotted lines, will effect the final positioning of the bed in the closet. The first movement is to swing the supporting frame 1 on the trunnions 20, clearing the door jamb as indicated by the arc *a b*; the second movement is to swing the hinge frame about the axis of the shaft 23 with the supporting frame 1 in the relative position thereon to which it has just been turned, the arc through which the edge portion of the mattress frame moves being indicated from *b* to *c*; the third movement is through the reentrant curve *c* to *d* as to the edge portion of the mattress frame, while the hinge frame is swung through the arc *c'* to *d'*, and during part of which time the outer edge portion of the mattress frame is manipulated to clear the door jamb. The bed frame is then swung on the trunnions 20 entirely into the closet, after which the door 26 may be closed.

To place the bed outside the closet the movements in manipulation are reversed.

When the bed is opened, or in other words, the mattress frame is lowered, the same is

substantially supported at the head end by the carrier frame 1 and the hinge frame on the door jamb, and at its outer end by the foot frame 19.

To afford a stop at the limit of the raised position of the mattress frame, the side rails may have lateral studs 27 thereon to engage the upper edge portions of the bracket extensions 6 of the carrier frame 1 with which they are held in contact by the tension of the springs 15 of the hinge joints between said bracket extensions and said side rails.

From the foregoing it is apparent that the structure is compact, simple in operation, and is capable of being moved through a relatively narrow door opening as compared to a structure utilizing a rigidly attached hinge frame. The peculiar mounting of the mattress frame on the carrier frame also facilitates the minimizing of the height of the doorway. It further permits the use of the ordinary coil spring bed bottom and accommodates a mattress and bedding of considerable thickness or depth.

Obviously, the entire structure admits of considerable modification without in the least departing from the spirit of the invention as defined by the appended claims, and it is, therefore, not limited to that shown in the drawings.

What is claimed is:

1. In an adjustable spring hinge structure, a supporting element, a pivotal element, a stud secured to said supporting element and capable of rotative adjustment thereon, a sleeve secured to said pivotal element and mounted rotatably on said stud, and a spring coiled about said stud, within said sleeve, and having one end secured to the sleeve and its other end secured to the stud.

2. In an adjustable spring hinge structure, a supporting element, a pivotal element, a stud having a polygonal, reduced, shouldered portion fitted in a counterpart socket in said supporting element, releasable means for holding said stud in said socket, a sleeve secured to said pivotal element and having bearings at its ends on said stud, and a spring coiled about said stud, within said sleeve, and having one end secured to the sleeve and its other end secured to the stud.

3. In an adjustable spring hinge structure for the purpose described, a supporting element, a second supporting element pivotal with respect to said first mentioned element, said first mentioned element having a polygonal aperture therein, a stud having a reduced shouldered portion near one end, of a polygonal shape corresponding to the aperture in said supporting element, the end portion of said stud beyond said polygonal portion thereof being screw-threaded and provided with a retaining nut to engage said supporting element to secure said stud in place, a sleeve rigidly secured to said pivotal

supporting element, flanged bearing collars fitted in the opposite end portions of said sleeve and rotatable on said stud, a spring coiled about said stud, one end portion of said spring being inserted through a transverse aperture in said stud and its other end portion being located in an open-ended slot in the adjacent end portion of said sleeve and retained by the bearing collar, and means on the end of said stud for engaging the outer face of said bearing collar to retain the assembled parts in place. 10

HARRISON U. CRAIN.