No. 631,369. Patented Aug. 22, 1899.

C. H. HILL.

PIVOT OR HINGE JOINT.

(Application filed July 5, 1898.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1

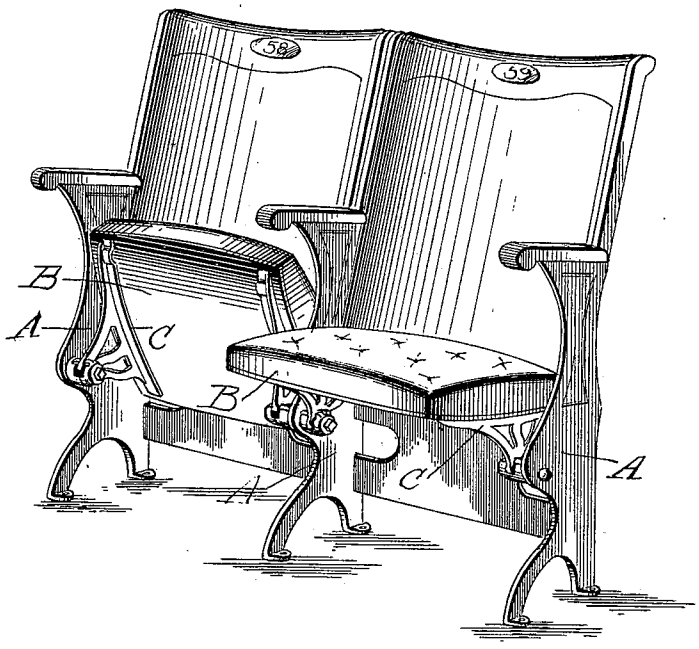
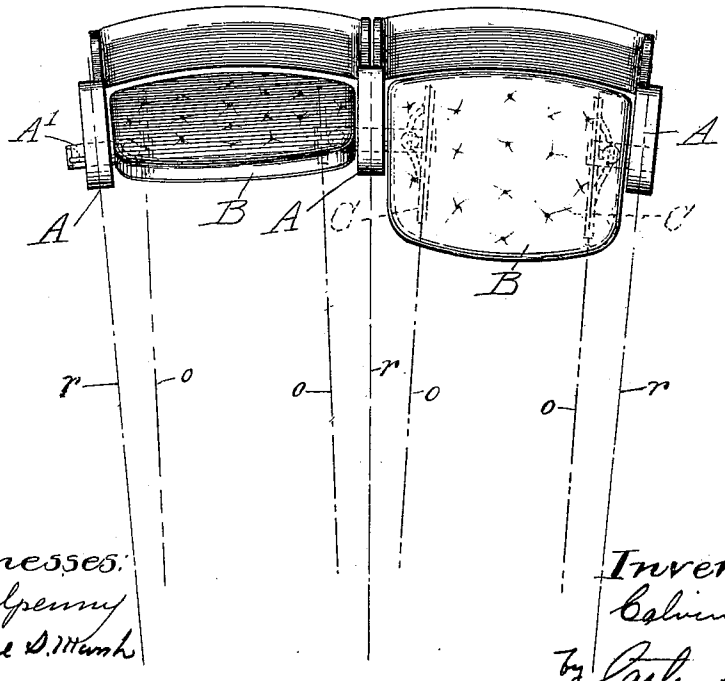


FIG. 2



Witnesses:
J. Halpenny
Samuel D. Wash

Inventor:
Calvin H. Hill
by Carter & Prouse
Attys

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

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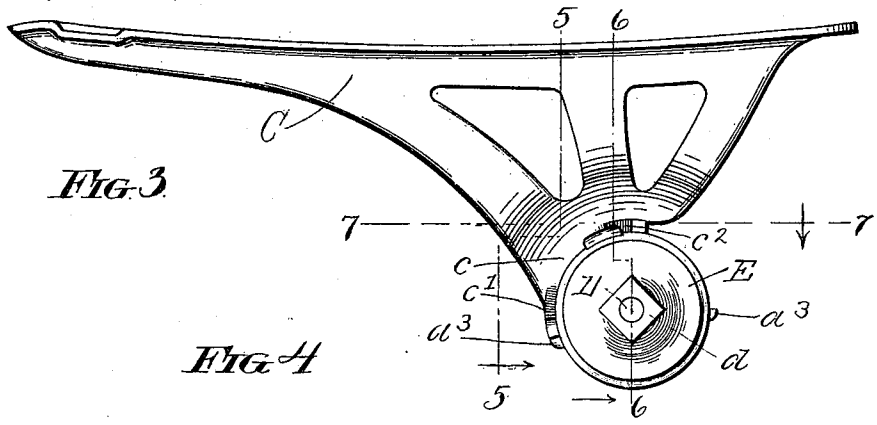


FIG. 3

FIG. 4

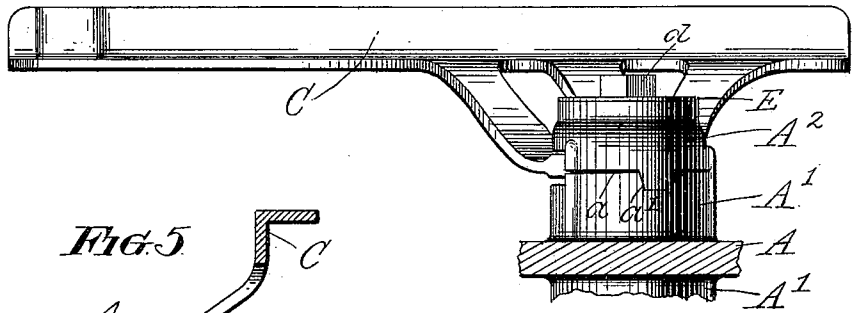
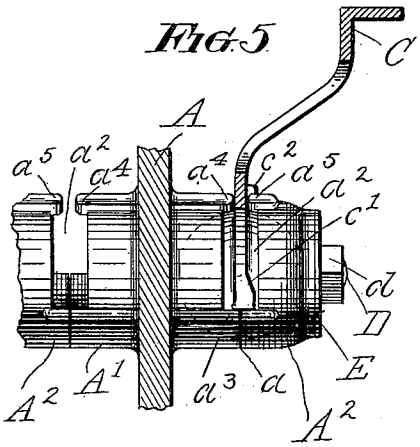


FIG. 5



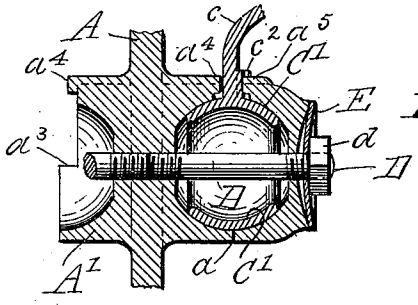


FIG. 6

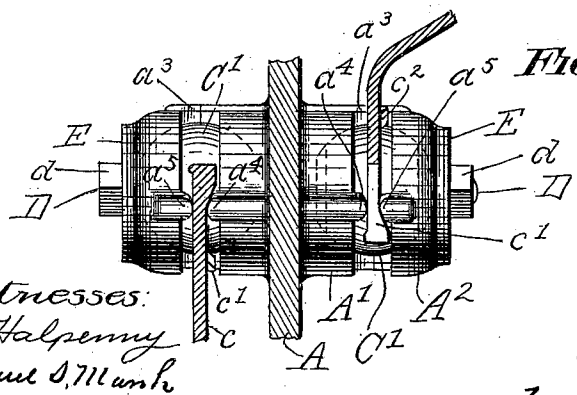


FIG. 7

Witnesses:
J. Halpenny
Samuel S. Munk

Inventor:
Calvin H. Hill
by Carter & Brownell
attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CALVIN H. HILL, OF CHICAGO, ILLINOIS.

PIVOT OR HINGE JOINT.

SPECIFICATION forming part of Letters Patent No. 631,369, dated August 22, 1899.

Application filed July 5, 1898. Serial No. 685,171. (No model.)

To all whom it may concern:

Be it known that I, CALVIN H. HILL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hinge-Joints, of which the following is a specification.

This invention relates to improvements in the pivot or hinge joints of the folding seats of opera-chairs and similar furniture, and has for its object to provide a strong, durable, and cheaply-manufactured joint of this character which will have sufficient flexibility of movement to admit of the chairs or seats to which it is applied being arranged either in straight rows or upon circles of any radius within the limits required by the conditions of practical use and upon either flat or arched floors, by which the stopping of the seats at their limits of movement when swung upward or dropped into seating position will be so cushioned as to cause little or practically no noise, and which to a considerable degree will automatically take up or compensate for the wear resulting from continued use.

The invention consists in the matters herein set forth, and particularly pointed out in the appended claims, and will be fully understood from this specification when considered in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of a couple of opera-chairs the folding seats of which are provided with hinge-joints of my improved construction. Fig. 2 is a top plan view thereof. Fig. 3 is a side elevation of the improved hinge-joint and attached seat-supporting bracket. Fig. 4 is a bottom plan view thereof. Fig. 5 is a front sectional elevation taken on line 5 5 of Fig. 3. Fig. 6 is a similar view taken on line 6 6 of Fig. 3. Fig. 7 is a top plan section taken on line 7 7 of Fig. 3.

In said drawings, A A designate the side frames of the chairs, and B B their folding seats, which are pivoted or hinged between the side frames A in a generally-familiar manner. In the improvement herein shown each of the brackets C, which support the seats B, terminates at its lower end in an open-ended hollow spherical ball C′, which forms the inner portion of the hinge-joint. This ball C′ is inclosed within a correspondingly-shaped socket provided within two coacting socket-sections A′ A^2, of which the section A′ is rigidly attached to the side frame A of the chair and may be conveniently cast integral therewith, while the section A^2 is detachably secured to the section A′ by a nut *d* on a bolt D, which extends through a central aperture in the wall of the section A^2 and loosely through the hollow ball C′ into the side frame A. This bolt D is in no sense a pivot-bolt, but simply acts to clamp the two sections of the socket together around the ball. The tightness or frictional resistance of the joint depends upon the pressure with which the two socket-sections are thus drawn together and may obviously be adjusted, as desired, by turning the nut *d*. As herein shown, also a spring E, which in this instance takes the form of a spring-washer made from sheet-steel or similar resilient material, is inserted between the nut *d* and the adjacent socket-section A^2, the end of the section being made hollowing or concave, as shown, so that the washer bears against it only at its perimeter. Then when the nut is tightened up the center of the washer is sprung inwardly, and a yielding resistance or cushion is thus afforded which will automatically take up or compensate for a considerable amount of wear occurring in the joint without permitting it to become loose or requiring the nut to be further tightened, and the utility of which in other connections will hereinafter appear.

The socket-sections are made separable upon a plane extending in this instance diametrically through the socket at right angles to the bolt D, and they are in contact on this plane throughout about half their circumference, as shown in Fig. 4, in which *a* designates the line of separation between the sections, and in which *a′* designates an interlocking lug and recess that is herein shown as provided to hold the sections in proper adjustment with relation to each other when the joint is assembled. Throughout their other half circumference, and in this instance substantially their upper half, the sections are cut away on their plane of separation to afford a slot a^2, through which the web *c* of the bracket C extends and within which it is free to oscillate in all directions within considerable limits. Thus said slot is made just enough longer than the circumferential length of the

web *c* at its juncture with the ball C′ to permit the necessary swinging of the seat from its horizontal to its upright or upwardly-inclined position, the end margins a^3 of the slot serving as stops to properly limit the movement and being to this end herein shown as reinforced or thickened for the purpose, and the width of the slot is made considerably greater for the most part than the thickness of the web, so that the latter can assume a relatively oblique position when the arrangement of the chairs in curved rows or otherwise causes the plane of oscillation of the hinge to deviate from the plane of separation of the socket-sections. The necessity of this sort of movement in the hinge-joints of opera-chairs and the like will be fully understood by reference to Fig. 2, which shows two adjacent seats of a circular row, and from which it will appear that in any such row the planes *r* of the side frames A will stand radially of the circle, and consequently at an angle to each other. The planes of oscillation *o* of the hinges of each seat, on the other hand, must always be parallel to each other, and will therefore always stand at an angle to said side frames, except when the chairs are arranged in a straight row. Moreover, this angle will vary accordingly as the radius of the circle upon which the chairs are arranged varies, being less or greater as the radius is longer or shorter, and it will consequently be obvious that in order that one pattern of chair may be adapted for arrangement either in straight rows or in circular rows of any desired radius it is necessary that the seat-joints should be so constructed as to possess a considerable flexibility of movement, which is accordingly herein provided for, as above described.

A further practically necessary or at least highly desirable feature of modern opera-chair construction is that the movement of the seat be cushioned at each end of its throw to prevent its making a noise when raised or lowered. To this end the slot a^2 is in the present improvement suddenly narrowed at a point about midway between its ends and almost directly above the axis of the hinge, as by two inwardly-projecting lugs a^4 and a^5, which approach each other so closely that the space between them is barely wide enough for the web *c* to move therein. Portions of the web near its edges are then made of increased thickness, so that as the seat is turned up or down by the attendant or occupant one or the other of these thickened parts wedges into the narrowed portion of the slot and stops the movement without noticeable jar or noise just before the web strikes the positive stop afforded by the end of the slot. This wedging action is not, however, ordinarily intended to resist or support the weight of the occupant, but is merely sufficient to bring the seat to rest when turned up or down under the ordinary force applied by hand. When the seat is sat down upon, the socket-sections by yielding apart slightly permit the web to come to rest solidly against the end of the slot, which thus positively resists the principal part of the strain. This yielding movement is permitted by the presence of the spring-washer E, and the tension upon this washer will be normally adjusted by means of the nut *d* to provide just the right amount of cushioning without causing the joint to work hard or bringing any undue strain upon the parts. The increased thickness of the edges of the web is herein shown as afforded by two beveled lugs c' and c^2, cast on the web close to the ball C′, as shown more particularly in Figs. 3, 5, and 7. The position of the parts shown in Figs. 3 and 4 is that occupied by them when sustaining their full load, the lug c^2 being wedged between the projections a^4 and a^5 far enough to slightly separate the sections A′ and A^2 and permit the lower edge of the web to contact solidly with the reinforced front edge a^3 of the slot. As hereinbefore stated, the object of the wide slot is to permit the bracket to swing laterally within the slot to whatever extent the arrangement of the chairs in a curved row may render necessary. At its narrowed point, between the lugs a^4 and a^5, no such lateral play of the web can take place; but inasmuch as this point, as herein shown, is located vertically over the axis of the hinge, while the angular deviation of the brackets from the plane of the slots due to the arrangement of the chairs in curved rows occurs in a horizontal direction, the absence of play at this point is not important, and the cushioning of the hinge is thus provided for without interfering with the practical universality of the joint. These figures, as well as Figs. 5, 6, and 7, are all illustrative of my improved construction as applied to one of the inner side frames of a row of seats, in which case the socket-sections A′ of the adjacent hinge-joints of both the adjoining seats are ordinarily cast integral with the frame and directly opposite to each other. In the case of the side frame at either end of the row the integral socket-section will of course be provided only on one side of the frame, that on the outer or aisle side being omitted. In Fig. 5 the seat-bracket C is shown in sections in the same position, as in Figs. 3 and 4, on the right-hand side of the frame, while on the left-hand side the bracket has been omitted entirely to better show the shape of the slot. This same position of the bracket is also shown in Fig. 6 and on the left-hand side of Fig. 7, while the right-hand side of the latter figure shows in section the position which will be occupied by the web of the bracket when the seat is turned up.

It will of course be understood that various changes may be made in the foregoing details of construction without involving a departure from the spirit of the invention, and also that a pivot-joint of the improved construction described may be employed in any other situation to which it is found adapted as well as for the particular purpose herein set forth.

I claim as my invention—

1. A hinge-joint for opera-chair seats, comprising a shell supported on the chair-frame and provided with a spherical socket and with an elongated slot opening out through the spherical wall of the socket, a seat-supporting bracket having a ball fitting within said socket and a contiguous web extending radially out through said slot and swinging longitudinally within the latter in the pivotal movement of the seat and adapted for contact with the ends of the slot to limit such pivotal movement, said slot being made of greater normal width than the thickness of the web to permit lateral play of the bracket but being narrowed at a point about midway of its length, and said web being provided with marginal portions of increased width adapted to wedge into said narrowed portion of the slot and cushion the hinge movement in advance of the contact of the web with the ends of the slot.

2. A hinge-joint for opera-chair seats, comprising a sectional shell supported on the chair-frame and provided with a spherical socket and with an elongated slot formed between the meeting edges of the sections and opening out of said socket and having wide end portions and an intermediate portion of reduced width, a seat-supporting bracket provided with a ball fitting within said socket and having a contiguous web projecting radially out of the socket through said slot and swinging longitudinally within the latter in the pivotal movement of the seat and adapted for contact with the ends of the slot to limit such pivotal movement, marginal portions of increased width but of less width than the end portions of the slot adapted to wedge into said intermediate portion of reduced width to cushionally hedge the hinge movement, in advance of the contact of the web with the ends of the slot, and means for yieldingly clamping the shell-sections together.

3. A hinge-joint, comprising a socket made in sections, a bracket having an open-ended hollow ball fitting within said socket, a slot formed between the meeting edges of the socket and made of reduced width midway between its ends, a thin web of the bracket projecting loosely through the slot and positively limiting the hinge movement by contact with the ends of the slot, beveled portions of increased width on the web near its edges adapted to wedge into the narrowed portion of the slot as the hinge approaches its limits of movement, and means for clamping the socket-sections yieldingly together comprising a bolt and nut and a spring-washer inserted between the nut and adjacent socket-section.

4. A hinge-joint for chair-seats and the like, comprising a spherical socket made in sections, a seat-bracket having a hollow ball fitting said socket, an aperture in the socket through which the bracket loosely projects, a clamping-bolt engaging one of the sections and passing through the hollow ball and through an aperture in the other section, a nut on said bolt, and a spring-washer inserted between the nut and adjacent section, whereby the parts are clamped yieldingly together.

5. The combination, with the side frames A and seats B, of the socket comprising the section A′ secured to the seat-frame and the section A^2 clamped to the section A′ by the bolt D and made concave at its end, the seat-bracket C having the web *c* and ball C′ fitting within said socket, the slot a^2 through which the web *c* projects, and the width of which throughout its end portions is greater than the thickness of said web so as to permit lateral play of the bracket, lugs a^4 and a^5 forming a narrowed portion at the middle of the slot, beveled lugs *c′* and c^2 adapted to wedge into said narrowed portion of the slot at the limits of the hinge movement, nut *d* on the clamping-bolt D, and spring-washer E inserted between the nut and socket-section A^2.

In testimony that I claim the foregoing as my invention I affix my signature hereto, in the presence of two subscribing witnesses, this 29th day of June, A. D. 1898.

CALVIN H. HILL.

Witnesses:
C. B. BRYAN,
H. W. CARTER.