Feb. 8, 1944. E. L. MONNOT 2,341,465

TWO-WAY CLAMP LOCK FOR DENTAL CHAIR BACKS AND THE LIKE

Filed Oct. 30, 1942 2 Sheets-Sheet 1

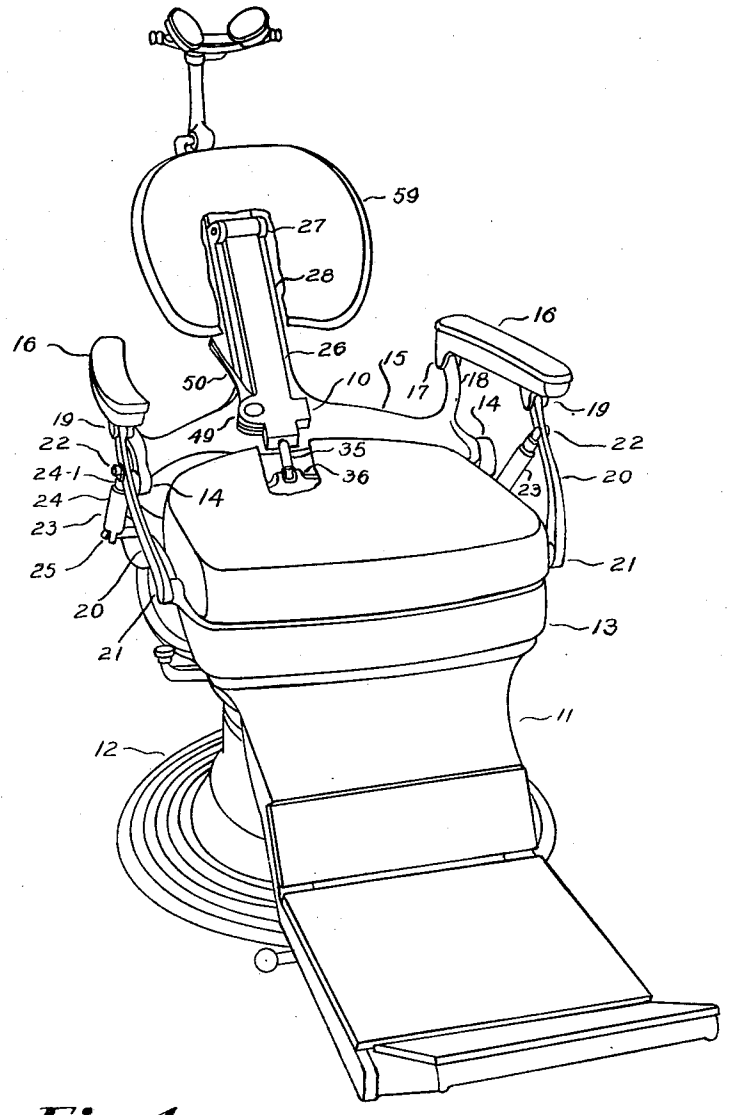


Fig. 1

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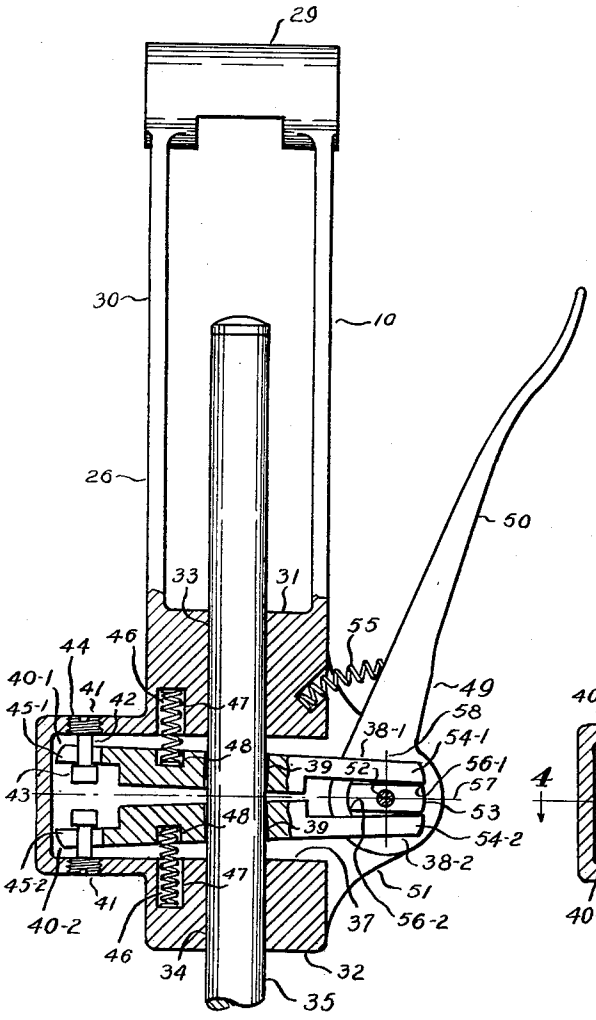


Fig. 2

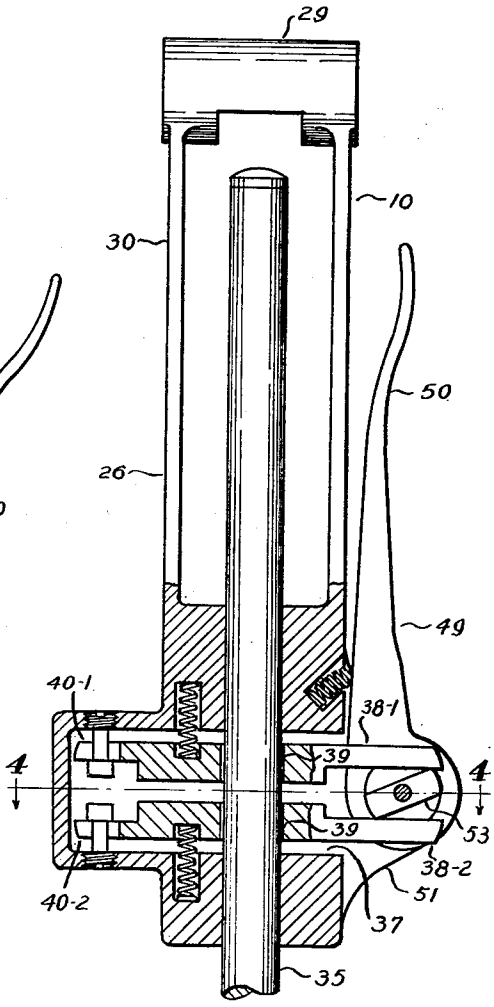


Fig. 3

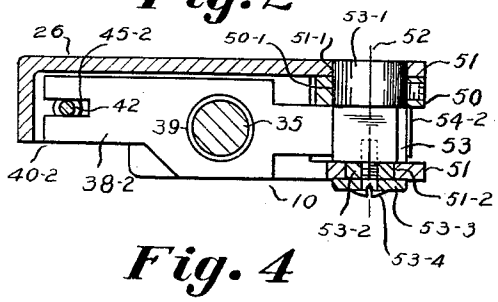


Fig. 4

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UNITED STATES PATENT OFFICE

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TWO-WAY CLAMP LOCK FOR DENTAL CHAIR BACKS AND THE LIKE

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Application October 30, 1942, Serial No. 463,908

6 Claims. (Cl. 155—162)

The invention relates to two way clamp locks for dental chair backs and the like, and is particularly adapted for use on a dental chair having spring means coacting with the chair parts to assist in swinging up or raising the back.

In such a chair it is desirable that the back be automatically locked against movement, either up or down excepting under the control of the operator during actuation of release means for the back lock.

The chair back is thus prevented from falling backwards by mere pressure alone of the person seated in the chair, and is likewise prevented from being swung upwards by the mere action of the springs.

The objects of the present invention include the provision of an improved two way clamp lock particularly adapted for use in a dental chair of the above description.

Further objects of the present invention include the provision of such an improved two way clamp lock, which is simplified in construction and in the arrangement and cooperation of its parts so that it may be manufactured and maintained with facility and economy.

Further objects of the present invention include the provision of an improved two way clamp lock which is adapted for substitution in a dental chair and the like for a one way clamp lock.

Further objects of the present invention include the provision of an improved two way clamp lock in which the parts are arranged for easy adjustment and certain operation.

The foregoing and other objects are attained by the two way clamp lock, apparatus, parts, improvements, combinations, and sub-combinations which comprise the present invention, and the nature of which is set forth in the following general statement, and preferred embodiments of which together with their mode of use are set forth in the following description, and which are particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

The nature of the present invention may be stated in general terms as including in a two way clamp lock, which may be in combination with a dental chair and the like having an upwardly and downwardly swinging back the upward swinging of which is facilitated by spring means, a housing member which may be pivotally connected preferably at its upper end to the chair back, the housing member having alined slide apertures formed therein, a slide rod slidable in the apertures, and the slide rod being pivotally connected preferably at its lower end with the dental chair seat frame and the like.

Within a transverse compartment in the housing member, preferably between the slide apertures for the slide rod, are located two transversely extending clamp bars having intermediate their ends clamp apertures through which the slide rod likewise extends.

At one side of the slide rod each clamp bar has a preferably adjustable loose pivotal connection with the housing.

Springs normally urge the clamp bars towards each other within the housing compartment for effecting a two way clamp locking of the housing on the slide rod when the clamp bars are spring urged towards each other.

On the other side of the slide rod, clamp lock release means include a lever pivotally mounted in the housing and having between the ends of the clamp bars a rotary cam. A spring normally presses the lever away from the housing to position the cam so as to permit the clamp locking of the slide rod by the clamp bars.

When it is desired to release the lock, the lever is rotated so that the cam rotates to spread apart the ends of the clamp bars and aline their central apertures with the slide rod, permitting sliding movement of the rod.

By way of example, embodiments of the improved two way clamp lock and the combination thereof in a dental chair are illustrated in the accompanying drawings forming part hereof, in which

Figure 1 is a front perspective view of one dental chair including the present improved two way clamp lock for the swinging chair back with one arrangement of spring means for urging the chair back upwards, portions being broken away for more clearly illustrating details;

Fig. 2, a rear fragmentary view with portions in section of the improved two way clamp lock detached from the chair, the parts being shown in locked position;

Fig. 3, a view similar to Fig. 2, the parts being shown in unlocked position;

Fig. 4, a transverse sectional view thereof as on line 4—4, Fig. 3.

Similar numerals refer to similar parts throughout the drawings.

The improved two way clamp lock is indicated generally by 10, and as shown is part of a dental chair indicated generally by 11 including a base 12 having operatively mounted therein in a usual manner elevator means not shown by which the

chair seat frame 13 and the parts carried thereby are raised and lowered.

The chair seat frame 13 has laterally spaced pivotal connections 14 at its rear with the lower end of a chair back frame 15.

The chair 11 also includes two laterally spaced chair arms 16, each having a pivotal connection 17 at its rear end with an upwardly extending bracket 18 on the chair back frame 15, and the front end of each arm 16 has a pivotal connection 19 with the upper end of a chair arm front link 20 which has a pivotal connection 21 at its lower end with one side of the front end of the seat frame 13.

Each front chair arm link 20 preferably has a pivotal connection 22 with the forward upper end of a compression spring unit 23.

Each compression spring unit 23 includes a compression spring not shown in Fig. 1 enclosed within telescoping guide tubes 24 and 24—1. The lower rear end of each compression spring unit 23 has a pivotal connection 25 with the rear end of the chair seat frame 13.

The improved back lock 10, as shown, is located at the front of the chair back frame 15, and includes a housing member 26 having a pivotal connection 27 at its upper end with an upwardly extending central member 28 of the chair back frame 15. The pivotal connection 27 of the housing member 26 includes an upper transverse pivot bearing 29 from which extends downwardly a forwardly opening longitudinally extending channel section 30. The housing member 26 also includes at its lower end longitudinally spaced slide rod bearing walls 31 and 32 having alined slide rod bearing apertures or bores 33 and 34 formed therein, the longitudinal central axis of the alined bearing bores 33 and 34 being perpendicular to the transverse axis of the upper cylindric pivot bearing 29.

The improved two way clamp lock 10 furthermore includes a preferably cylindric slide rod 35 slidable in the preferably cylindric alined bores 33 and 34 of the housing member 26. In the dental chair 11 as shown the lower end of the slide rod 35 has a pivotal connection at 36 with the seat frame 13.

The housing member 26 furthermore has formed therein, preferably between the slide rod bearing walls 31 and 32, a transverse compartment 37 within which are located two transversely extending clamp bars 38—1 and 38—2 each having intermediate its ends a clamp aperture 39 through which the slide rod 35 extends. Each clamp aperture 39 is cylindric and slightly larger in diameter than the slide rod 35.

At one side of the slide rod the clamp bars 38—1 and 38—2 have respectively preferably adjustable loose pivotal connections indicated generally by 40—1 and 40—2 with the housing member 26.

Each loose pivotal connection 40—1 and 40—2 includes as shown a spool indicated generally by 41 having a reduced shank 42 within the compartment 37, an inner head 43 within the compartment 37, and an outer externally threaded head 44 screwed in a suitable threaded aperture formed in a transverse wall of the housing member 26.

The spools 41 have longitudinal axes alined with each other and parallel with the longitudinal axis of the slide rod 35.

The loose pivotal connections 40—1 and 40—2 furthermore include as shown notches 45—1 and 45—2 formed respectively in the ends of the clamp bars 38—1 and 38—2 and fitting on the spool shanks 42.

Preferably between the loose pivotal connections 40—1 and 40—2 and the slide rod 35, compression springs 46 are interposed respectively between oppositely opening sets of sockets 47 and 48 formed respectively in the walls 31 and in the clamp bar 38—1 and in the wall 32 and in the clamp bar 38—2.

On the other side of the slide rod 35, release means indicated generally by 49 are provided for the clamp lock 10, and as shown and preferably the release means 49 include a lever 50 having a pivotal mounting as between two ears 51 formed on the housing member 26 on the opposite front and rear sides of the clamp bars 38—1 and 38—2.

The axis of pivoting 52 of the lever 50 is as shown and preferably at right angles to a plane including the longitudinal axis of the slide rod 35.

The clamp lock release means 49 furthermore includes, at one side of the lever 50 and arranged for pivoting about the lever pivot axis 52, a pivot or rotary cam 53 extending between adjacent ends 54—1 and 54—2 of the clamp bars 38—1 and 38—2. A compression spring 55 is preferably interposed between oppositely opening sockets formed in opposite faces of the lever 50 and the housing member 26, the compression spring 55 urging the lever 49 away from the housing 26 so as to normally maintain the rotary cam 53 in the position shown in Fig. 2 which permits locking of the slide rod 35 against sliding movement in either direction along its longitudinal axis with respect to the housing member 26, the springs 46 pushing the clamp bars 38—1 and 38—2 towards each other about the loose pivot connections 40—1 and 40—2, angling and clamping the apertures 39 against the slide rod 35.

The clamp bar 38—1 clamps the rod 35 against separation from the housing member 26, and the clamp bar 38—2 clamps the slide rod 35 against movement into the housing 26, because of the opposite angling and clamping of the clamp apertures 39 on the slide rod 35.

The rotary cam 53 has cam corners 56—1 and 56—2 which are parallel with the cam and lever pivot axis 52, the cam corner 56—1 being located on the outside of the pivot axis 52 and the cam corner 56—2 being located between the pivot axis 52 and the slide rod 35.

The cam corners 56—1 and 56—2 are likewise located in the position shown in Fig. 2 closer to the transverse plane 57 extending through the pivot axis 52 and between the clamp bars 38—1 and 38—2 at right angles to the longitudinal axis of the slide rod 35, than the spacing of the cam corners 56—1 and 56—2 from the plane 58 passing through the cam and lever pivot axis 52 and parallel with the longitudinal axis of the slide rod 35.

In other words, the rotary cam 53 has a generally oblong cross section in a plane perpendicular to the pivot axis 52.

Accordingly when the lever 50 is rotated or swung from the position shown in Fig. 2 towards the housing 26, to the position shown in Fig. 3, the cam corners 56—1 and 56—2 serve to abut and slide against the opposed faces of the clamp bar ends 54—1 and 54—2, separating the clamp bar ends 54—1 and 54—2 and swinging the clamp bars away from each other, so as to aline the clamp apertures 39 with the slide rod 35 permitting movement of the slide rod 35 in either direction in the housing member 26 as long as

the operator applies the necessary pressure against the lever 50.

Accordingly in the chair 11, pressure of the back of a person seated in the chair against the back 59 thereof which is secured on the back frame 15, cannot swing the back 59 and the back frame 15 downwardly when the clamp lock 10 is in the locked position as shown in Figs. 1 and 2.

Likewise, the pressure of the compression spring units 23 cannot force the back frame 15 and back 59 upwardly when the improved clamp lock 10 is in the locked position.

Both upward and downward swinging of the back frame 15 and back 59 about the pivot connections 14 on the seat frame 13 can only occur when the operator applies pressure against the lever 50, thereby improving comfort and safety of the dental chair 11 in use.

A particularly advantageous feature of the chair 11 with the compression spring units 23 tending to swing the back frame 15 and back 59 upwards, and the two way clamp lock 10 which prevents movement of the back frame and back excepting when the operator applies pressure against the lever 50, arises when the operator is a woman, as is the usual dental assistant or nurse, and the patient on the chair is a heavy man completely anaesthetized. In such a case the patient is inert and the dead weight of the upper portions of his body is supported on the chair back. The provision of the compression spring units makes it well within the strength of the nurse to raise the chair back and the trunk, arms and head of the patient from the lowered position of the back and reclining position of the patient usual for resuscitation purposes. The two way clamp lock 10 enables complete control of the chair back and its load at all positions.

In every condition of use, the improved two way clamp lock 10 is automatic in its two way locking action the instant pressure is released from the lever 50.

The improved two way clamp lock 10 also includes a novel construction and arrangement of the lever 50, the rotary cam 53, and their mounting in the ears 51 of the housing member 26, as best shown in Fig. 4.

The rectangular cam 53 extends from one side of a cylindric stub shaft 53—1 whose diameter is at least equal to the maximum dimension of the cam 53 radially of the axis 52.

A cylindric bore 51—1 is formed in one of the ears 51 and has a diameter equal to the stub shaft 53—1, and the inner end of the lever 50 has likewise formed therein a cylindric bore 50—1 also fitting the stub shaft 53—1.

The clamp bar ends 54—1 and 54—2 have lateral edges offset from the inner faces of the ears 51, and the inner end of the lever 50 fits between the lateral edges of the ends 54—1 and 54—2 at one side of the clamp bars and the ear 51 having the bore 51—1 formed therein. The bore 50—1 of the lever 50 registers with the bore 51—1 so that in assembling and disassembling the stub shaft 53—1 and the cam 53 which are preferably formed together as a shaft and cam unit, the shaft and cam unit may be inserted or withdrawn into or from the registering bores 50—1 and 51—1.

The opposite ear 51 has a bore 51—2 formed therein which is coaxial with the axis 52 and the bores 50—1 and 51—1 but has a smaller diameter than the bores 50—1 and 51—1.

A washer 53—2 fits in the bore 51—2 and a larger washer 53—3 fits against the outer face of the ear 51 having the bore 51—2 formed therein.

A machine screw 53—4 extends through the bores of the washers 53—2 and 53—3 and is screwed into an internally threaded socket formed in the adjacent end of the cam 53.

The washers 53—2 and 53—3 and their separable assembly with the cam 53 which has a greater maximum dimension radially of the axis 52 than the diameter of the washer 53—2 fitting in the bore 51—2, thus provides a separable double thrust bearing and retaining means for the shaft and cam unit including the cam 53 and stub shaft 53—1, which is insertable into the removable from the registering bores 50—1 and 51—1 of the lever 50 and the other ear 51.

I claim:

1. In a two way clamp lock, a slide and mounting member having a slide aperture formed therein and including two spaced transverse walls, a slide rod extending through and slidable in the aperture, two transversely extending clamp bars between the transverse walls, each clamp bar having intermediate its ends a clamp aperture and the slide rod extending through the clamp apertures, a floating pivotal connection between each clamp bar and one of the transverse walls at one side of the slide rod, spring means located between the pivotal connections and the slide rod and urging the clamp bars towards each other, and rotary can means between the clamp bars at the other side of the slide rod for swinging the clamp bars away from each other.

2. In a two way clamp lock, a slide and mounting member having a slide aperture formed therein and including two spaced transverse walls, a slide rod extending through and slidable in the aperture, two transversely extending clamp bars between the transverse walls, each clamp bar having intermediate its ends a clamp aperture and the slide rod extending through the clamp apertures, a floating pivotal connection between each clamp bar and one of the transverse walls at one side of the slide rod, spring means located between the pivotal connections and the slide rod and urging the clamp bars towards each other, and rotary cam means between the clamp bars at the other side of the slide rod for swinging the clamp bars away from each other, and means for moving each pivotal connection toward and away from its transverse mounting wall.

3. In a two way clamp lock, a slide and mounting member having a slide aperture formed therein and including two spaced transverse walls, a slide rod extending through and slidable in the aperture, two transversely extending clamp bars between the transverse walls, each clamp bar having intermediate its ends a clamp aperture and the slide rod extending through the clamp apertures, a floating pivotal connection between each clamp bar and one of the transverse walls at one side of the slide rod, spring means located between the pivotal connections and the slide rod and urging the clamp bars towards each other, and rotary cam means between the clamp bars at the other side of the slide rod for swinging the clamp bars away from each other, and lever means rotatably adjustable on the cam means for rotating the cam means.

4. In a two way clamp lock, a slide and mounting member having a slide aperture formed therein and including two spaced transverse walls, a slide rod extending through and slidable in the aperture, two transversely extending clamp bars

between the transverse walls, each clamp bar having intermediate its ends a clamp aperture and the slide rod extending through the clamp apertures, a floating pivotal conection between each clamp bar and one of the transverse walls at one side of the slide rod, spring means located between the pivotal connections and the slide rod and urging the clamp bars towards each other, and rotary cam means between the clamp bars at the other side of the slide rod for swinging the clamp bars away from each other, and means for moving each pivotal connection toward and away from its transverse mounting wall, and lever means rotatably adjustable on the cam means for rotating the cam means.

5. In a two way clamp lock, two members reciprocable with respect to each other, two clamp members operative between the reciprocable members, each clamp member serving in a clamping position to prevent relative movement of one of the reciprocable members to the other in one direction opposite to the movement prevented by the other clamp member, said clamping members being releasable to permit movement of said one reciprocable member in both said directions of prevented movement, means urging the clamp members to clamping position, and means for releasing the clamping members from clamping position, the releasing means including a rotary member journalled in one of the reciprocable members, and a lever rotatably adjustable on the rotary member.

6. In a two way clamp lock, two members reciprocable with respect to each other, two clamp members operative between the reciprocable members, each clamp member serving in a clamping position to prevent relative movement of one of the reciprocable members to the other in one direction opposite to the movement prevented by the other clamp member, said clamping members being releasable to permit movement of said one reciprocable member in both said directions of prevented movement, means urging the clamp members to clamping position, and means for releasing the clamping members from clamping position, the releasing means including a rotary member, one of the reciprocable members having bearing bore means removably journalling the rotary member, and a lever having an aperture removably fitting on the rotary member.

EDWARD L. MONNOT.