Feb. 9, 1937. M. T. VANDERVOORT 2,070,387

THEATER SEAT

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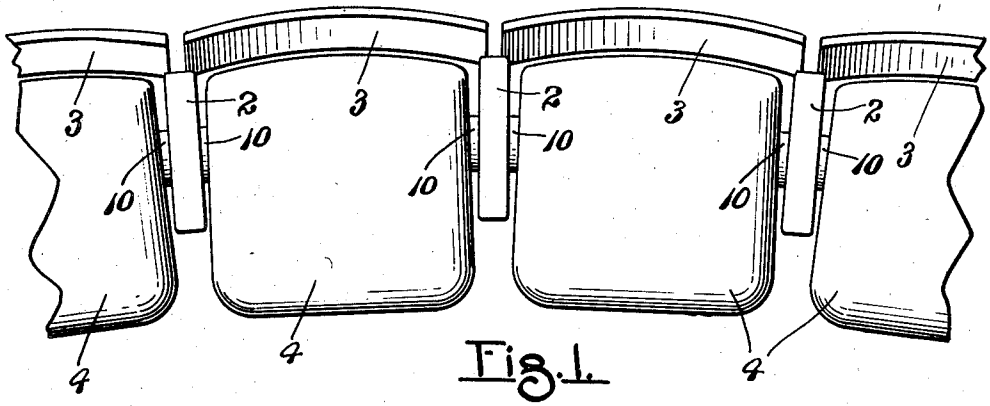


Fig. 1.

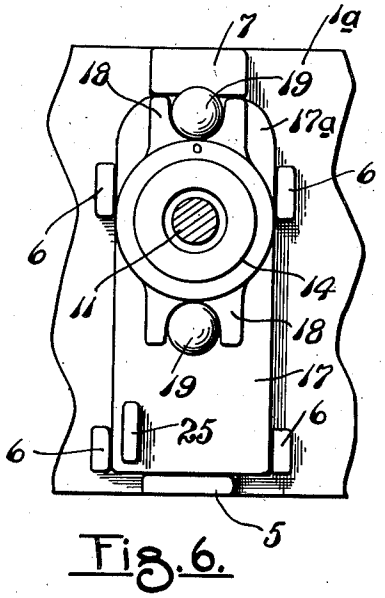


Fig. 6.

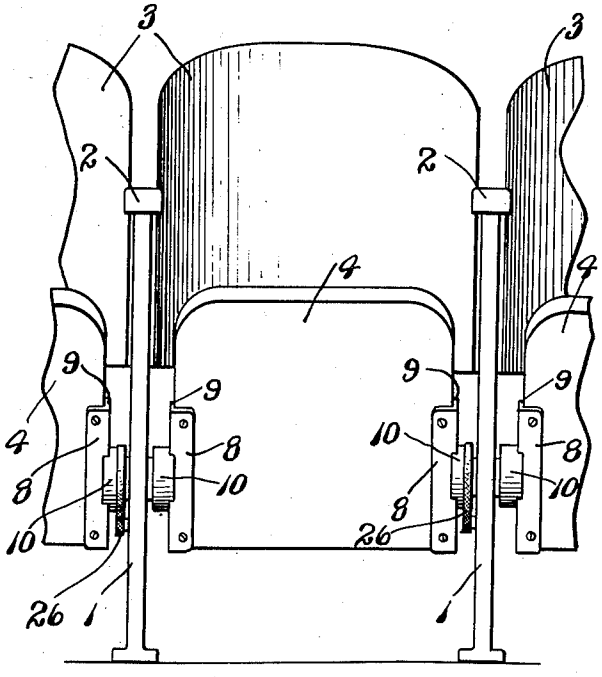


Fig. 2.

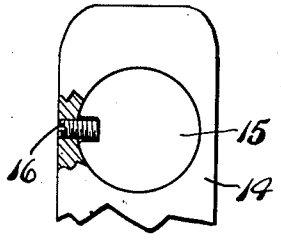


Fig. 7.

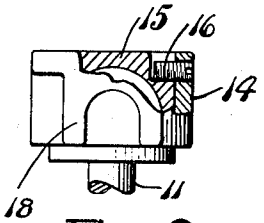


Fig. 8.

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THEATER SEAT

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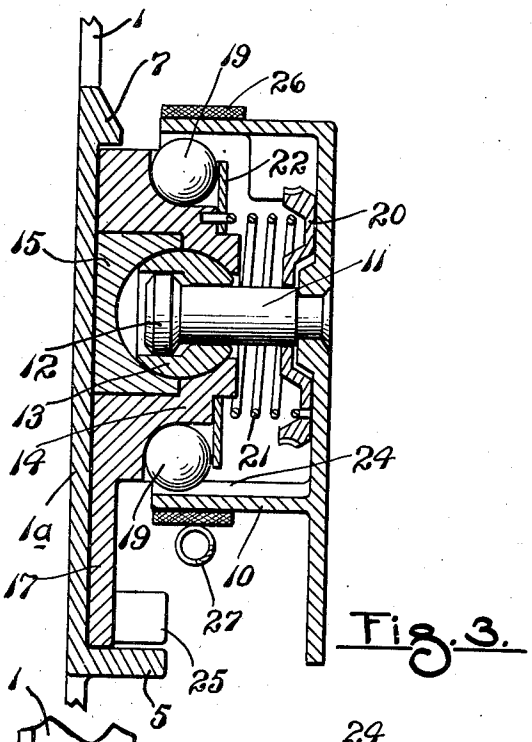


Fig. 3.

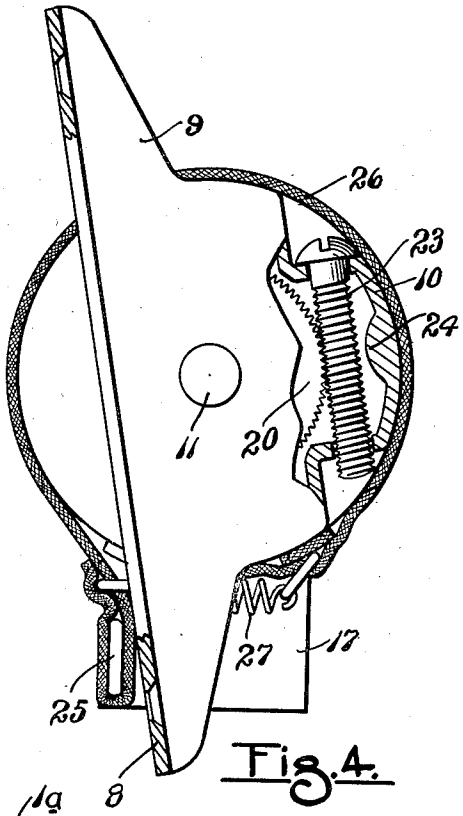


Fig. 4.

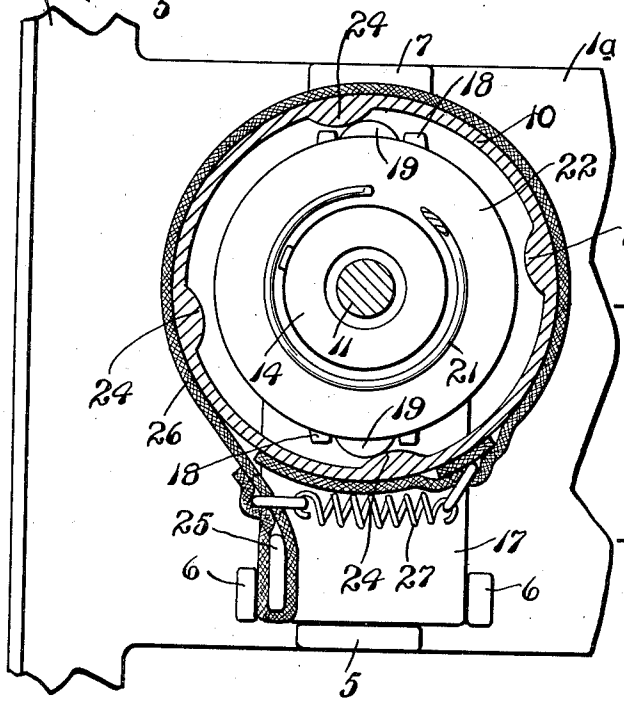


Fig. 5.

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UNITED STATES PATENT OFFICE

2,070,387

THEATER SEAT

Milford T. Vandervoort, Grand Rapids, Mich.

Application February 18, 1935, Serial No. 6,954

8 Claims. (Cl. 155—86)

This invention relates to seats, particularly to the type known as theater seats, and is more especially concerned with a novel hinge construction by means of which the seat member may be mounted on supporting standards in a novel and effective manner.

It is an object and purpose of the present invention to provide a seat of the character stated and to provide a hinge for the seat proper which has a connection with the standard such as to permit a limited substantially universal movement of the seat member with respect to the standards which support it, whereby without alteration or change in structure in any way a complete seating equipment may be installed on a floor irrespective of such irregularities in surface as may be present in the floor, so that the standard at one side of the seat is at a higher level than at the other side. Also a plurality of the seats may be installed side by side, consecutive seat members being mounted upon the same standard at adjacent sides and a row of seats disposed in a curved or circular or arc form and with a wide variation in the radius of curvature of the arc of a row or of different rows of seats.

Many further objects and purposes of the invention will appear, together with advantages coming therefrom, particularly in installation, whereby all of the standards for a row of seats may be properly installed and secured in spaced apart relation to each other and then the seat members very quickly and easily connected to and disposed between the spaced apart standards. These and various other objects and purposes, together with novel construction for attaining the same will be understood from the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is a plan view showing a part of a row of seats assembled and installed, using my invention.

Fig. 2 is a fragmentary front elevation, somewhat enlarged, of the row of seats and illustrating a vertical supporting standard at one side at a slightly higher level than at the other.

Fig. 3 is a vertical section taken centrally through the seat hinge.

Fig. 4 is a side elevation, partly in section, of the seat hinge.

Fig. 5 is a vertical section through the hinge on a plane substantially at right angles to the section shown in Fig. 3.

Fig. 6 is a fragmentary elevation illustrating the manner in which a seat member is connected to and supported by a standard, and

Figs. 7 and 8 are, respectively, a fragmentary elevation and plan, partly in section, of a detail of structure used in the assembly of the parts of the hinge structure.

Like reference characters refer to like parts in the different figures of the drawings.

The standards 1 for supporting theater or like seats are disposed in vertical spaced apart relation, being equipped with the usual arm rests 2. Between adjacent standards backs 3 are located and secured. Likewise seat members 4 are disposed between and mounted at its adjacent sides, through suitable hinge connections, on the standards as shown. With my invention, on a horizontal cross member 1a of each of the vertical standards and at each side thereof, a bottom supporting lug 5 and spaced apart pairs of guide lugs 6 are integrally cast to project toward the seat 4, while above and spaced a distance from the supporting lug 5 there is an upper lug 7 having an inclined cam surface from its upper edge downwardly as shown in Fig. 3. Such parts are readily made on the seat standards 1 when the same are cast.

The seat proper or seat member 4 has connected thereto at each of its side edges an angle member of metal, comprising a horizontal leg 8 and a vertical leg 9 integral with which and extending outwardly from the vertical leg 9 is a substantially cylindrical housing 10 which is open at its outer end and closed at its inner end by the leg 9 with which it is integrally cast.

A stud 11 is permanently secured at one end to the closed end of the housing 10 and extends centrally therethrough, being formed at its free end with an enlarged head 12 (Fig. 3). The stud passes through a ball member 13 which is recessed in one side to receive the head 12. The ball member 13 is received in a socket in a member 14, which has an opening to pass the stud 11, the socket being completed by a plug 15 which is received in a suitable recess made in the member 14 and is concaved to fit the curved surface of the ball 13, as best shown in Fig. 3.

In the assembly of the parts the stud 11 is passed through the opening in the ball 13 and head 12 is received in the recess thereof, then the stud is passed through the opening in the member 14 until the ball seats against the curved or concaved socket therein, after which the plug 15 is assembled in position and is held against outward movement by a screw 16, as shown in Figs. 7 and 8, which prevents any outward movement of the plug 15 and also holds the same against rotative movement.

The member 14 is cast integral with a vertical plate 17 which extends below the member 14 and, as indicated at 17a, a short distance thereabove. This plate is of a width so as to be received between and guided by the spaced apart ears 6, its lower end coming to rest against the lower supporting lug 5. Prongs or forks 18 are also cast integral with the member 14 and the plate 17 between which balls 19 are located, the forks 18 with the associated plates 17—17a providing suitable sockets to receive the balls.

A disk 20, provided around its periphery with worm teeth, is loosely mounted over and around the stud 11 and bears against the inner side of the closed end of the housing 10 (Fig. 3). A coiled torsion and compression spring 21 has one end thereof connected with the disk 20 and the other end with the member 14, such other end of the spring passing through a retaining flat ring 22 which serves to retain the balls 19 in their sockets, the spring by reason of its compression action bearing against both the disk 20 and the flat retaining ring 22 and holding them spaced apart and pressed against the closed end of the housing 10 and the member 14, respectively. The torsion of spring 21 can be increased or diminished by turning a worm screw 23 (Fig. 4) which is suitably mounted to extend across a portion of the housing 10, as shown in Fig. 4, and which is readily accessible by a screw driver for turning the same to adjust the tortional force of the spring 21. The balls 19 come against integral stop ribs 24 cast with and at the inner sides and longitudinally of the housing 10 so that the relative rotation of the housing 10 and the parts connected therewith with respect to the member 14 and the support on which it is mounted is limited to the engagement of the balls 19 and the ribs 24 with which they are engaged. The springs 21, when free to do so, turn the housing (Fig. 5) in a clockwise direction until stopped by two of the ribs 24 engaging the balls 19. On turning the housing in the opposite direction against the force of the springs, a movement may be given through an angle somewhat less than 90°, or until the other ribs 24 strike against the opposite sides of the balls 19.

Near the lower end of the plate 17 a lug 25 is cast to extend therefrom at right angles. One end of a brake band 26 is permanently secured to lug 25 and passes around the housing 10, as shown in Fig. 5. The brake band is held with a yielding pressure against the cylindrical outer surface of the housing 10 by means of a tension spring 27 secured adjacent opposite ends of the brake band and tending to pull the same against the housing 10. With each seat member 4 there will be two of the hinge members connected thereto. In practice the brake band 26 is used in connection with one only of the housing 10, though, of course, if desired it can be used with both.

Each seat member 4 has two hinge constructions as described secured, one at each side edge of the seat, as shown in Fig. 2. To assemble the seat with the already installed standards 1 spaced apart from each other the required distance, it is merely necessary to bring the lower ends of the plates 17 to the inclined cam surfaces at the upper portions of the lugs 7 and push downwardly with the plates guided between the lugs 6 until the upper edges of plate 17 come to the lower sides of the lugs 7, where upon springs 21, which have been compressed, snap the upper ends of the plates 17 under said lugs 7, and the installation of the seat 4 between a pair of spaced apart standards is complete. The connection is a secure one which cannot permit an accidental disconnection or disassembly of the parts. By using a screw driver or other suitable tool a disconnection can be made by inserting the same between the plate 17 and the cross members 1a of the standards so as to permit upward movement of plates 17 past the upper retaining lugs 7 with which they are associated.

The seat can be moved downwardly to horizontal position by the weight of a person sitting thereon overcoming the springs 21. Also on the downward movement of the seat the brake is partly released by reason of the particular spring construction acting thereon, shown in Fig. 5, so that the brake does not act to retard the downward movement of the seat as much as it does the upward movement. It is evident that the universal movement which is present to a sufficient limited extent between the housings 10 (and the studs 11 mounted thereon) and the supporting standards permits a fairly wide tolerance in the matter of locating the supporting standards for the seat members relative to each other. That is, the standards do not have to be in parallel vertical planes, but can diverge to a greater or less extent as may be needed in installing a row of seats on a curve. Also, the lower ends of the standards do not have to be in the same horizontal plane, as the hinge will operate perfectly even though, due to unevenness in the floor of the theater or other building in which the seats are installed, one standard may be raised a short distance above the level of its next adjacent standard, as shown in Fig. 2.

The construction described has proved very practical and useful. The readiness and ease of operation, the ability to install the seats in the arc of any curve which is met with, and also the ability to ignore roughness and unevenness in a floor, coupled with the strength and durability of the hinge make the invention one of a very practical and desirable character. It is to be understood that while there has been shown and described a hinge wherein the seat is automatically lifted when the person using the same rises, using the springs 21 for such purpose, it is not necessary in order to obtain a major portion of the advantages of the invention that the seat be of the automatic or self-lifting character. The springs 21 may be entirely eliminated or may remain merely as compression springs, in either case, the disk 20 and the adjusting screw 23 being eliminated. As thus constructed the seat would not automatically lift upon release of weight thereon. It would not need the brake which is shown and described. However, all of the advantages of installation and the like described would be present even though the automatic lifting of the seat was dispensed with.

It is further to be understood that while the housing 10 is shown as connected one to each side of the seat member 4, and the cooperating members with which it is associated are mounted on the standards 1, these parts may be reversed in position so that the housings are mounted on the standards and the parts cooperating therewith on the seat members. The same advantageous results are obtained with this reversal of parts. The invention, therefore, contemplates that it may be applied both as illustrated and described for seats which are automatic or self-lifting or for seats which are not self-lifting; also with the parts reversed as described. The

invention is not to be limited to the specific detail of construction shown but is to be considered comprehensive of all forms of structure coming within the scope of the appended claims which define the invention.

I claim:

1. A hinge for theater seats or the like comprising, two cooperating hinge members, one adapted to be attached at a side edge of a seat and the other to a supporting standard, one of said members including a housing open at one end, and the other of said members projecting partly into said housing, a stud connected with and extending centrally of the housing, and a ball around the free end of said stud, said other member of the hinge having a socket receiving said ball, whereby the members having a relative universal movement with respect to each other, and having relative turning movement with respect to each other about the axis of the stud.

2. A construction containing the elements in combination defined in claim 1, combined with a compression spring disposed around said stud and seated at one end at the bottom of said housing and bearing at the other end against the inner end of the other member of the hinge to thereby tend to move the two members away from each other.

3. A construction containing the elements in combination defined in claim 1, combined with a coiled spring having one end attached to the closed end of the housing and the other end attached to the other member of the hinge, whereby said spring moves the hinge members to a predetermined position with respect to each other and its tension is increased when moved in the opposite direction, combined with cooperating stops on said members to limit the extent of relative turning movement of the hinge members.

4. A construction containing the elements in combination defined in claim 1, combined with a disk mounted over and for turning about said stud, said disk having a threaded outer edge, a screw mounted on said housing in mesh with said disk for turning and adjusting and holding the disk in a fixed adjusted position with respect to the housing, and a coiled compression and tortional spring located around the stud having one end attached to said disk and the other to the other member of the hinge, as specified.

5. A hinge for theater or like seats comprising, two hinge members, one including a substantially cylindrical housing having an open end and a closed end, and the other hinge member extending partly into the open end of the housing, said other member being provided with ball receiving sockets, balls in said sockets, means to retain the balls therein, a stud connected to the closed end portion of the housing and extending centrally therethrough, a ball on the free end of the stud, said stud being permitted a free turning movement around its axis in said ball, and said other member having a socket receiving said ball, and spaced inwardly extending longitudinal ribs at the inner side of the housing with which said balls engage on relative turning movement of the hinge members with respect to each other in either direction.

6. In a construction of the class described, spaced apart vertical standards, a seat member located between the standards, a hinge comprising two hinge members attached one at each side edge of the seat, said hinge members having a rotative movement about a horizontal axis with respect to each other and also having a limited universal movement with respect to each other, guides on the standards for receiving the outer hinge members, compression springs between the hinge members normally holding the outer hinge members in an outer position but permitting the same to move inwardly with respect to the inner hinge members, a cam lug on the edge of the standards over which the outer hinge members pass when the same are moved downwardly, said springs compressing during such passage and automatically moving the outer hinge member underneath said lugs after the same have passed thereby, and a lower supporting lug for the outer hinge members to support the same after the same have passed by the cam lugs, as and for the purposes specified.

7. A hinge for theater seats or the like comprising, two cooperating hinge members, one adapted to be attached at a side edge of a seat and the other to a supporting standard, one of said members including a housing open at one end, and the other of said members projecting partly into said housing, a stud connected with and extending centrally of the housing, a bearing member around the free end of said stud, and slidably mounted thereon, whereby axial adjustment of the hinge members is had, said other member of the hinge having a recess for receiving said bearing member, whereby the members may have relative turning movement with respect to each other about the axis of the stud and spring means having its ends connected to the hinge members for urging the same to a predetermined position, said spring means also tending to move the hinge members axially apart.

8. In a theater seat, two spaced apart supporting standards, a seat member located between the standards, hinges located at each side edge of the seat member, each of said hinges having two parts, one part being attached to the seat member and the other part having a connection to the first hinge part, said connections including means between these hinge parts whereby relative rotation about a horizontal axis and a limited universal movement is permitted and whereby the other of said hinge parts may move in and out transversely of said seat and compression spring means located between the hinge parts for urging said other hinge parts outwardly and means securing said other hinge parts to said standards including guide means mounted on each standard between which an outer hinge member of the hinges is received on moving the same downwardly to and between said guide means, combined with supports on the standards at the lower end of the guide means against which the outer hinge members engage, whereby the seat with the hinges thereon may be readily installed on and between said supports.

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