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CHAIR MOUNTING FOR AIRPLANES

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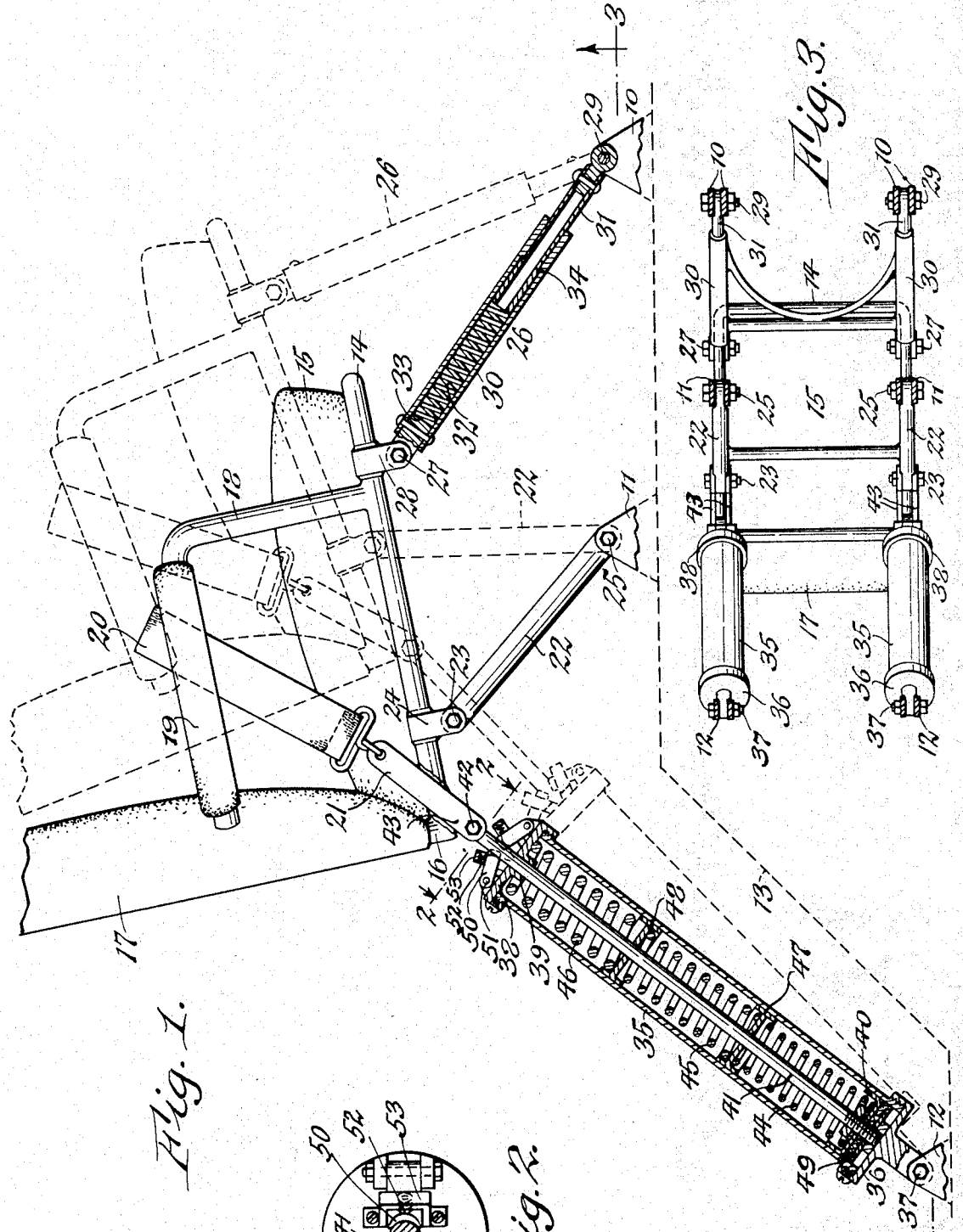


Fig. 1.

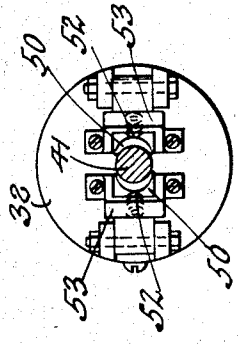


Fig. 2.

Fig. 3.

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CHAIR MOUNTING FOR AIRPLANES

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3 Claims. (Cl. 155—9)

This invention relates to means for mounting a chair on the body of an airplane.

It has been found by experience that when an airplane comes to a sudden stop, as for example when striking an obstruction, that the aviator or passenger occupying a chair or seat fixed on the body is often injured by reason of this person being subjected to a violent forward throw notwithstanding that this person is fastened to the chair by straps or otherwise.

One of the objects of this invention is to provide simple and reliable means for mounting the chair of an airplane on the body of the same so as to permit the chair and its occupant to move forwardly independently of the body in the event of the latter striking an obstruction and thus save the occupant from the full force of the shock which would otherwise be experienced.

Another object of this invention is to combine with a chair mounting of this character cushioning means which yieldingly resist the forward movement of the chair relative to the body and thus aid in reducing the shocking effect on the person.

A further object of this invention is to provide means for preventing the chair after being thrown forwardly violently, from recoiling backwardly quickly and thereby preventing injury which otherwise might occur to the person occupying the seat.

With this end in view this invention consists generally of means for mounting the chair on the body of an airplane so that this chair when moved forwardly relative to the body will travel a path which extends forwardly and upwardly instead of merely forwardly, whereby the person occupying the chair will be tossed in a curved forward and upward direction and thus relieved substantially from the shock to which the person is subjected, also by associating with this chair mounting spring means which yieldingly resist the forward movement of the chair and thus cushion the shock when the body stops suddenly and the chair is thrown forwardly, and also by embodying in this chair mounting detent means whereby the chair after being thrown forwardly is prevented from again moving rearwardly until manually released.

In the accompanying drawing:

Fig. 1 is a side elevation of means for mounting a chair on the body of an airplane in accordance with this invention.

Fig. 2 is a bottom plan view thereof.

Fig. 3 is a cross section, on an enlarged scale, taken on line 3—3, Fig. 1.

In the following description similar characters of reference indicate like parts in the several figures of the drawing:

The numerals 10, 11 and 12 represent, respectively, front, intermediate and rear brackets or lugs which are mounted on the body of an airplane so as to practically form an integral part thereof, said body, which is represented in Fig. 1 by dotted lines 13, being of any suitable construction.

Over the front part of this body is arranged the chair which is to be occupied by the person riding in the airplane such as the aviator or passenger. Although this chair may be variously constructed, that form which is shown in the drawing comprises a lower horizontal bottom frame 14 which carries a seat 15, a rear frame 16 projecting upwardly from the bottom frame 14 and carrying the back 17, and side frames 18 connecting the bottom frame and back frame and carrying the arm rests 19. In order to prevent the person occupying the chair from falling out of the same while the airplane is in operation, fastening means are provided which preferably consist of a strap 20 adapted to pass forwardly around the body of this person and connected at opposite ends by any suitable means with eyes 21 which project upwardly from the lower rear parts of the chair frame.

Means are provided for connecting the chair with the body of the airplane in such a manner that the chair is capable of moving in a direction horizontally lengthwise of the body and also vertically in the forward part of this movement. The means for this purpose which are shown in the drawing are preferably constructed as follows:

The numerals 22 represent two rear upright comparatively short links which are arranged on opposite sides of the rear part of the chair and each of which is pivoted at its upper end by means of a horizontal transverse bolt 23, or the like, to a lug 24 projecting downwardly from the rear side part of the chair frame 14 while the lower end of this link is pivotally connected by means of a horizontal transverse bolt 25, or the like, with the adjacent intermediate lug 11 on the body of the airplane. The numeral 26 represents two upright front comparatively long links which are arranged on opposite sides of the front part of the chair and each of which is pivotally connected at its upper end by means of a horizontal transverse bolt 27, or the like, with a lug 28 projecting downwardly from the adjacent front side portion of the chair bottom while the lower end of this link is pivotally connected by means of a horizontal transverse bolt 29, or the like, with the adjacent bracket 10 of the airplane body.

In the preferred construction the lower pivots 25 and 29 of the rear and front links are arranged horizontally in line, as shown in Fig. 1, or substantially so, and the upper pivots 23 and 27 of these links are arranged on a plane which rises forwardly relative to the plane on which the lower pivots 25 and 29 of these links are arranged.

In the normal operative position of this chair, in which it is rearmost and lowermost relative to the body, both the rear and front links 22 and 26 are inclined rearwardly and these links stand at an angle of approximately 30° relative to the bottom frame of the chair, as shown by full lines in Fig. 1. When, however, the forward movement of the airplane is suddenly checked or stopped altogether, such as would occur, for example when the airplane strikes an obstruction, then the momentum of the chair together with the load of the person occupying the same will cause this chair and the person to be thrown violently forwardly. During such movement of the chair both the rear and front links 22 and 26 will also move forwardly into a position in which they are substantially upright and perpendicular to the bottom frame of the chair and the body of the airplane, as shown by dotted lines in Fig. 1. Due to the fact that the rear links 22 are comparatively short and the front links comparatively long, the chair which is pivotally supported on the upper ends of these links will not only move forwardly when the airplane body is stopped but will also be tipped upwardly at its front end relative to its rear end due to the forwardly rising path or line of movement which the chair follows at this time, whereby the person occupying the seat will be moved forwardly and also elevated during the latter part of this forward movement, instead of being merely moved forwardly in a direction substantially parallel with the body of the airplane, thereby causing this person to be tossed forwardly and upwardly and relieving this person from the full effects of the shock which otherwise would be experienced.

The shock to which the occupant of the seat is subjected is further reduced by so organizing the front links of the chair supporting means that they absorb a considerable amount of this shock. Although various absorbing means may be employed for this purpose those which are shown in Fig. 1 are suitable for this purpose and as there shown the same consist in making each of the front links 26 of upper and lower sections 30, 31 which have their outer ends pivoted respectively to the chair and body of the airplane while their inner ends are guided upon each other and are yieldingly held in a distended or elongated position by means of a spring 32. In the construction shown in Fig. 1 the upper section 30 of each front link is made in the form of a tube and the lower section 31 has the form of a hollow rod and the spring 32 is arranged in the tubular upper section 30 of this link and bears with its upper end against a shoulder 33 at the upper end of the link section 30 while its lower end bears against the upper end of the tubular rod 31. The extension or elongation of the two sections of each link 26 under the action of the spring 32 may be limited in various ways, for example, by means of cooperating shoulders formed on these parts as shown at 34 in Fig. 1. The tension of the springs 32 of the two front links is such that normally the upper and lower sections of the front links are extended to the limit provided by the cooperating shoulders 34 and the front part of the chair is maintained thereby in an elevated position. When, however, a load is imposed upon the chair which exceeds the strength of the springs 32, the latter during the forward movement of the chair which is independent of the body and caused by the latter striking an obstruction, will effect a compression of the springs 32 due to the weight of the person occupying the chair and thereby cushion this person and relieve him from the full effects of the shock which occurs at this time.

Means are provided which operate to yieldingly hold the chair in its rearmost normal position but permit the chair and its occupant to move forwardly under their momentum independently of the body of the airplane in the event that the latter is stopped by engagement with an obstruction. The preferred means provided for this purpose which are shown in the drawing are constructed as follows:

The numeral 35 represents two cylinders arranged in rear of the side parts of the chair and each provided at its lower end with a head 36 which is pivoted by means of a horizontal transverse bolt 37 to the adjacent bracket 12 on the body of the airplane. At its upper end each of these cylinders is provided with a head 38 having a central guide opening 39. Within the lower part of each of the cylinders 36 is arranged a piston or plunger 40 which is provided with an upwardly extending connecting rod 41 passing through the guide opening 39 in the upper end of the respective cylinder and pivotally connected by means of a horizontal transverse bolt 42 with an attaching lug 43 projecting downwardly from the adjacent part of the chair frame. Within each cylinder is arranged a spring system which is so constructed that during the first part of the upward movement of the plunger 40 in this cylinder this spring system will offer only a moderate resistance to the plunger and thereafter this spring resistance increases and is most pronounced during the last part of the upward stroke of the plunger in the cylinder, thereby causing the forward movement of the chair when thrown forwardly by momentum, independently of the body of the airplane, to be checked gradually by encountering progressively increasing resistance, thereby further relieving the person occupying the chair from the shock incident to the collision of the body of the airplane with some obstruction. In the preferred form of these spring resistance means, the same comprise helical spring sections 44, 45 and 46 which are arranged in the cylinder 35 around the connecting rod 41, the lowermost one of these spring sections 44 being interposed between the plunger 44 and a lower separating disk 47 mounted on the rod 41, and being made of comparatively light wire so that the same is only of light tension and offers a moderate resistance, the intermediate section 45 of this spring being interposed between the lower separating disk 47 and an upper separating disk 48 mounted on the rod 41 and made of heavier wire than the lower spring section 44 so as to be of stronger tension and offer a greater resistance, and the upper spring section 46 being arranged between the upper separating disk 48 and the upper head 38 of the cylinder and made of heavier wire than the intermediate spring section so as to be of high strength or tension and offer the greatest resistance to the upward movement of the plunger. The combined effect of the several spring sections of the spring system in each of these cylinders 35 operates to hold the chair in its rearmost normal position which is limited by engagement of the lower ends of the connecting rods 41 with the lower heads 36 of the cylinders 35, as shown in Fig. 1. If the chair is thrown forwardly only to a moderate extent relative to the

body of the airplane due to a comparatively mild impact of the body with an obstruction, then this partial forward movement of the chair will only compress the lowermost or light springs 41, but when the momentum with which the chair is thrown forward relative to the body of the airplane is greater, then the plungers 40 will move upwardly in the cylinders to a greater extent and not only compress the lowermost light springs but also compress the intermediate heavier springs. If, however, the chair is thrown forwardly under a momenum of maximum force, then each piston 40 will not only compress the lower light tension spring 44 and the intermediate spring 45 of greater tension but also compress the upper heaviest spring 46, the tension of which offers the greatest resistance thereby combining the cushioning effect of the several springs in each group and causing the shock upon the person occupying the chair to be reduced accordingly.

In the absence of any other provision, the chair after being thrown forwardly by momentum relative to the airplane body will be again returned automatically to its rearmost normal position by resilience of the several sections of the spring system. This return or recoil movement of these springs is, however, checked by making each of the cylinders 35 practically airtight and providing each of the plungers 40 with an annular packing 49 so that when each plunger moves upwardly air is free to move from the upper end of each cylinder past its plunger and into the lower end of the respective cylinder, but when this plunger moves downwardly the air in the lower end of this cylinder will be trapped therein and escapes slowly therefrom into the upper part of the respective cylinder due to the leakage of the air past the joint between the respective plunger and cylinder. By this construction each cylinder 35 and its plunger 40, in effect, form a dash-pot which operates to prevent the recoil of the spring system from returning the chair suddenly to its rearmost position and possibly injuring the occupant of the chair if this occupant were jerked back suddenly after being thrown forwardly.

Means are provided whereby the chair after being moved forwardly by momentum independently of the airplane body is prevented from immediately recoiling backwardly and possibly injuring the occupant of the chair, such as snapping back the head and breaking the neck of the occupant. The means suitable for this purpose shown in the drawing comprise two detent pawls 50 arranged in an inclined position on opposite sides of the connecting rod 41 and above the upper head 38 of each cylinder 35 and pawl pivoted at its outer end by a pin 51 on said head and engaging its inner end with the adjacent part of said rod, and a spring 52 which holds said pawl yieldingly in engagement with said rod and which is interposed between the respective pawl and an abutment 53 on the upper head 38 of the cylinder. By these means the plunger and connecting rod 41 are free to move upwardly in the cylinder and compress the cluster of spring sections therein for cushioning the forward movement of the chair and its occupant but retrograde movement of these parts is prevented by the clutch action of the detent pawls 50 on the connecting rod thereby avoiding the sudden return of the chair upon reaching the limit of its forward movement and eliminating the possibility of harmful effects which might follow such quick return of the chair.

Restoration of the chair to its normal rearward position can be readily effected by first releasing the pawls 50 manually from the connecting rod 41 so that the resilience of the springs 44, 45, 46 can operate to move the chair and thereupon reengaging these pawls with said rod ready for repeating this detent function.

These means for mounting the chair of an airplane on the body positively absorb most, if not all, the objectionable shock which the occupant of the chair would suffer in the absence of such provision and therefore reduce to a minimum the liability of injuring the occupant of the chair in case the airplane collides with an obstruction or effects a nose dive.

I claim as my invention:

1. An airplane comprising a body, a chair, a linkage movably connecting said chair and body and spring means which yieldingly resist the forward movement of said chair and is constructed to offer successively greater resistance to the forward movement of the chair and which includes a lower cylinder pivoted to the body, a plunger arranged in the cylinder and connected with the chair, a lower light tensioned spring engaging with said plunger, an upper heavy tensioned spring engaging with the upper end of said cylinder, and an intermediate tensioned spring interposed between said lower and upper springs.

2. An airplane comprising a body, a chair, a linkage connecting said chair and body, and means for controlling the movement of said chair relative to said body including a cylinder connected with the body, a plunger movable lengthwise in the cylinder and having a rod connected with said chair, spring means interposed between said plunger and the cylinder and operating to yieldingly resist the forward movement of said chair, and detent means which permit forward movement of the chair but prevent backward movement of the same including pawls pivoted on the cylinder and engaging opposite sides of said rod, and retaining springs interposed between said pawls and abutments on said cylinder and operating to hold the pawls in engagement with said rod.

3. A chair mounting for airplanes comprising a comparatively long front link pivotally connected at its lower and upper ends with the body of the airplane and the front part of the chair, respectively; a comparatively short rear link spaced from said front link and pivotally connected at its lower and upper ends with said body and the rear part of the chair, said chair and links being movable forwardly and backwardly in a vertical plane, the pivotal connections between the lower ends of said links and the airplane body being stationary and arranged horizontally in line and the pivotal connections between the upper ends of said links and said chair being arranged on an inclined line which rises forwardly relative to the line on which the lower ends of said links are pivotally connected with said airplane body, so that in the rearward position of said links the chair will be tipped upwardly at its front end to a moderate extent while in the forward position of the links the chair will be tipped upwardly at its front end to a greater extent, and yielding means whereby said chair is yieldingly held in its rearmost position and permits the same to move forwardly under its momentum when the forward movement of the airplane is arrested.

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