

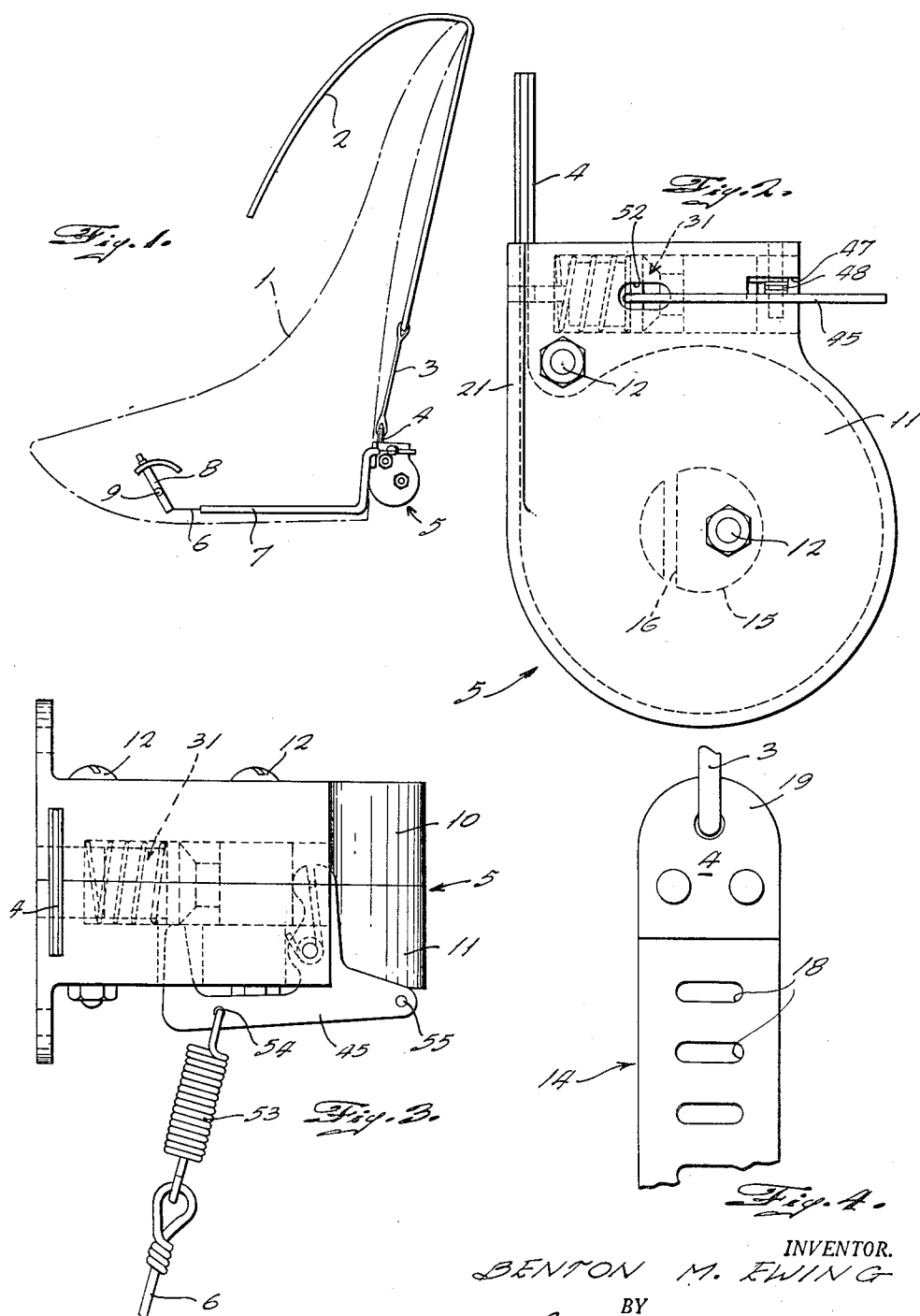
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INERTIA LOCKING REEL

2,705,115

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2 Sheets-Sheet 1



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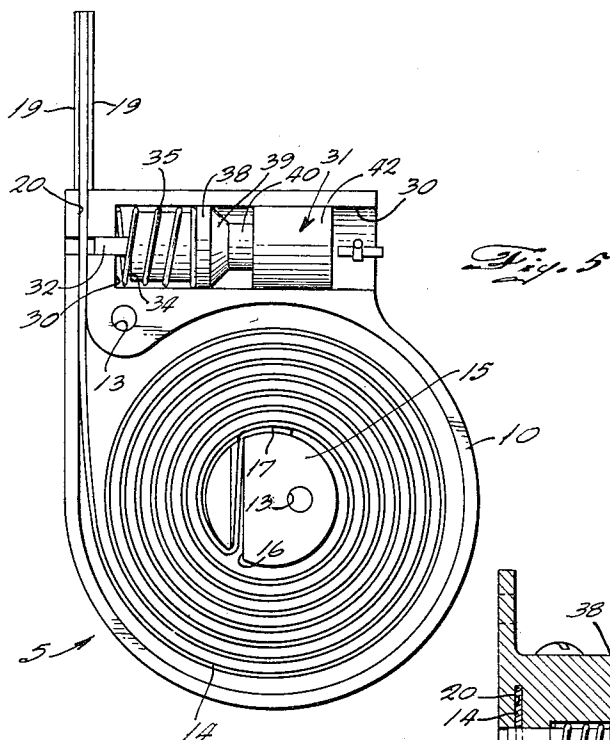


Fig. 5

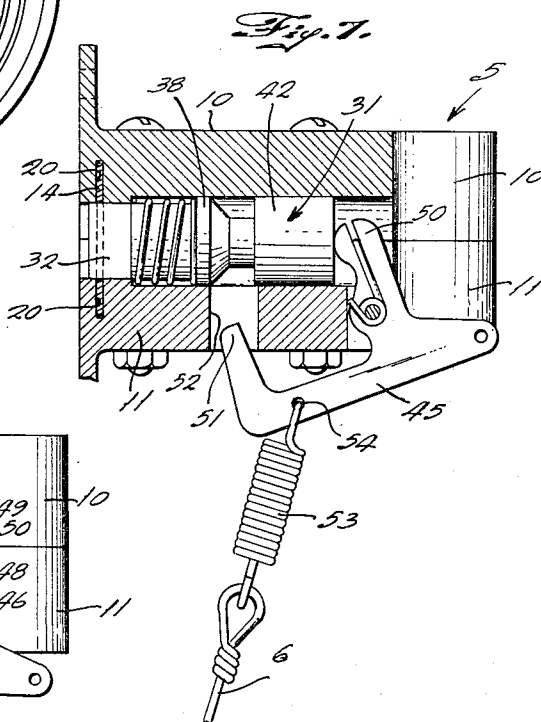


Fig. 7

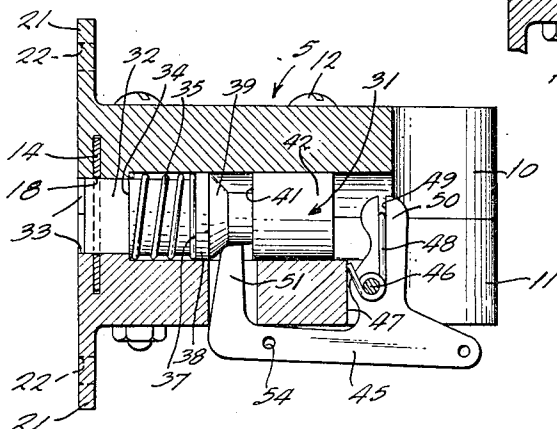


Fig. 6

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INERTIA LOCKING REEL

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This invention relates to improvements in inertia locking harness, and, more particularly, in the reels thereof.

Inertia locking harness is used, typically in aircraft, to hold the torso of an occupant of a seat back against the seat so as to prevent injury due to sudden deceleration while permitting freedom of movement forwardly from the seat under normal conditions. Such harness is well known in itself, being shown, for example, in previous Geohagan Patent 2,403,653, and including shoulder straps attached rearwardly of the seat to a cable, which, in turn, is attached to an inertia locking reel, which normally permits paying out of the cable so that the occupant of the seat may move forwardly, but which locks under sudden deceleration holding the body and shoulders of the occupant against the back of the seat and preventing injury due to sudden forward movement. Such reels as heretofore constructed have been of relatively complicated construction, involving, in general, the use of a drum with a spring take up and an inertia locking mechanism operating to lock the drum either positively or frictionally, the construction being rather complicated and requiring comparatively massive parts due to the braking of the cable indirectly through the drum. It is the general object of the present invention to provide an inertia locking reel of simple and reliable construction and capable of acting directly upon the tension member.

A reel embodying the invention in a preferred form will now be described with reference to the accompanying drawing, and the features forming the invention will then be pointed out in the appended claims.

In the drawing:

Figure 1 is a schematic side elevation of a harness utilizing a reel embodying the invention in a preferred form;

Figure 2 is an enlarged side elevation of the reel itself;

Figure 3 is a plan view of the reel of Figure 2;

Figure 4 is a detail view of part of the tension member employed in the reel;

Figure 5 is a side elevation with parts removed to show interior structure; and

Figures 6 and 7 are plan views with parts removed to show internal structure, and showing the parts in two different operating positions.

In Figure 1, there is indicated in phantom at 1 the general outline of a seat with which are associated a shoulder harness or straps 2 attached through a link 3 to the end 4 of the tension member of the reel 5. There is indicated at 6 and 7 the inner and outer components of a Bowden wire operated by a handle 8 pivotally mounted at 9 and serving to control the reel operation as described below.

The reel is divided centrally into two halves or cheeks 10 and 11, as shown in Figures 2 and following, held together by means of bolts 12 passing through bolt holes 13 (Figure 5) and hollowed out to form a generally circular interior space for accommodating the tension member 14.

The tension member 14 is held by a central hub including a half hub 15 on the right half of the reel housing 10 and a corresponding half hub on the reel housing 11, these half hubs being slotted as indicated at 16 to take the end 17 of the tension member, which, as shown in Figure 5, is bent backwardly so as to pass through the slot 16 and is then further bent over so as to lock itself to the hub when tension is applied. The

tension member 14 is a spring steel tape or strip having a number of locking apertures 18 (Figure 4) for co-operating with a locking plunger as later described. Its end 4 is reinforced by a pair of plates 19 riveted to it, and a hole through the plates and tape accommodates the link 3, as indicated in Figure 4. The tape emerges from the reel through a slot 20, and the plates 19 seat on the top of the reel to either side of the slot for limiting the retraction of the tape 14 in the reel, as indicated in Figures 2 and 4. The tape being properly wound around the hub 15, will tend to withdraw itself into the retracted position by reason of its own spring and without requiring any additional spring mechanism. Side flanges 21, having holes 22, provide for screwing or otherwise fastening the reel to the back of the seat.

A bore 30 formed in the upper part of the parts 10 and 11, accommodates an inertia locking plunger indicated generally at 31. This plunger has a tip 32 accommodated in an opening 33 extending transversely of the slot 20, and serving, when the plunger is moved leftwardly from the position of Figure 5 or into the position of Figures 6 and 7, to lock the tension member 14 by passing through one of the holes 18 therein.

Shoulder 34 at the base of the locking projection 32 seats against the end of the bore 30 to limit the forward movement of the plunger, and a spring 35 surrounding the reduced end of the plunger and thrusting against the end of the bore 30 and shoulder 37 on the plunger serves for normally holding the plunger in retracted or non-locking position. Rearwardly of the shoulder 37, the plunger is formed with a short cylindrical section 38 of substantially the full bore diameter, a taper 39, a reduced neck 40 and a shoulder 41, the plunger rearwardly of this shoulder being of substantially full bore diameter, as indicated at 42.

A catch 45 is pivoted on a pin 46 to the cheek piece 11, being accommodated by an opening or slot 47 in the piece 11, and being urged in the clockwise direction by a small spring 48 wrapped around the pin 46, one end of this spring being engaged in a slot 49 formed in the inwardly extending arm 50 of the catch 45 and the other abutting against the member 11, as indicated in Figures 3 and 6. The catch includes also a toe 51 extending through an opening in the piece 11. Normally, this toe engages the section 38 of the plunger 31, being held in the position of Figure 3. When a deceleration moves the plunger forwardly or toward the left in the figures, the toe 51 comes against the bevel 39 assisting the deceleration and holding the plunger in locked position, as indicated in Figure 6, the force of spring 35 being insufficient to force the plunger backwardly against the toe 51. The end of Bowden wire 6 is attached through a spring 53 to the catch 45, the end of the spring passing through a hole 54 in the latter. Where control from the other side of the chair may be desired, the spring may be screwed into a hole 55 on the opposite side of the pin 46.

Once the device has operated to lock tension member 14, it will accordingly remain locked until the occupant by operating handle 8 rearwardly, pulls out the toe 51, permitting the spring 35 to retract the plunger 31, whereupon the plunger section 38 will again be in position to hold the toe back in the position of Figure 3.

Impact or other sudden deceleration may involve intermittent deceleration, as, for example, where there may be successive impacts, and it will be observed that the catch arrangement of the invention insures that once a sufficient deceleration to actuate the locking mechanism has occurred, the reel will remain locked until released by the occupant of the seat.

In the preferred construction, the means for attaching the reel to a seat, such as the side flanges 21, are positioned so as to be substantially coplanar with the slot 20 and close to the passage or opening 33 which accommodates the plunger tip 32. The tension on the tape 17 when locked is thus communicated directly to the seat and puts little or no strain on the reel housing generally.

What is claimed is:

1. An inertia locking reel comprising a housing, a

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tape having a series of apertures, means for yieldably retracting the tape into the housing, an inertia locking member having a projection adapted to enter a said aperture for locking the tape to the housing, and means mounting the inertia locking member for movement between locking and non-locking position, the housing having a slot accommodating the tape as it passes out of the housing and a passage extending through the slot and accommodating the projection on the said locking member.

2. An inertia locking reel comprising a housing, a central hub within the housing, a spring tape having a series of apertures, an end of the tape being attached to the hub and the tape being wound around the hub inside the housing for yieldably retracting itself into the housing, an inertia locking member having a projection adapted to enter a said aperture for locking the tape to the housing, and means mounting the inertia locking member for movement between locking and non-locking position.

3. An inertia locking reel according to claim 2, comprising also a spring for yieldably holding the locking member in non-locking position.

4. An inertia locking reel comprising a tension member, a housing, means for yieldably retracting the tension member into the housing, an inertia locking plunger movable into locking relation with said tension mem-

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ber and into non-locking relation thereto, a spring for yieldably holding the plunger in non-locking position, and a spring catch for holding the plunger in locking position, the plunger having a recess adapted to receive the catch when the plunger is in locking position.

5. An inertia locking reel according to claim 4, comprising also manually operable means for withdrawing the catch from the recess to permit spring return of the plunger from locking to non-locking position.

6. An inertia locking reel according to claim 4, in which the spring catch comprises a pivotally mounted member having an arm extending into the path of movement of the plunger away from locking position for limiting movement of the plunger away from locking position.

References Cited in the file of this patent

UNITED STATES PATENTS

20	64,319	Hubbell	Apr. 30, 1867
	574,141	Davis et al.	Dec. 29, 1896
	2,106,053	Laingor	Jan. 18, 1938
	2,257,099	Beirise	Sept. 30, 1941
	2,394,523	Pancoe	Feb. 5, 1946
25	2,403,653	Geohegan	July 9, 1946
	2,434,119	Nordmark	Jan. 6, 1948
	2,503,440	Johanningmeier	Apr. 11, 1950