Oct. 10, 1950 N. STRAUSSLER 2,525,244

STRUT OR STAY

Filed May 10, 1945 2 Sheets-Sheet 1

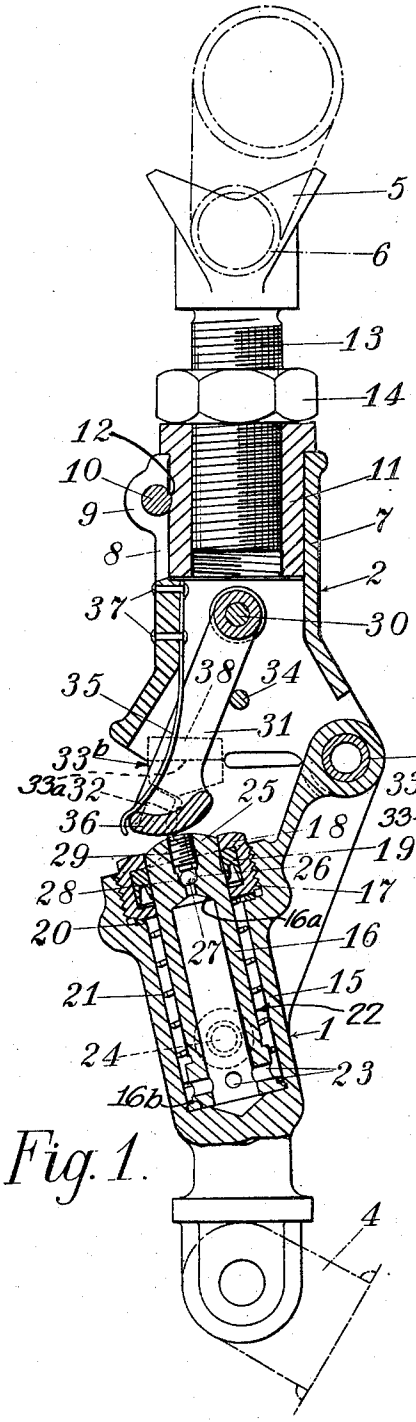
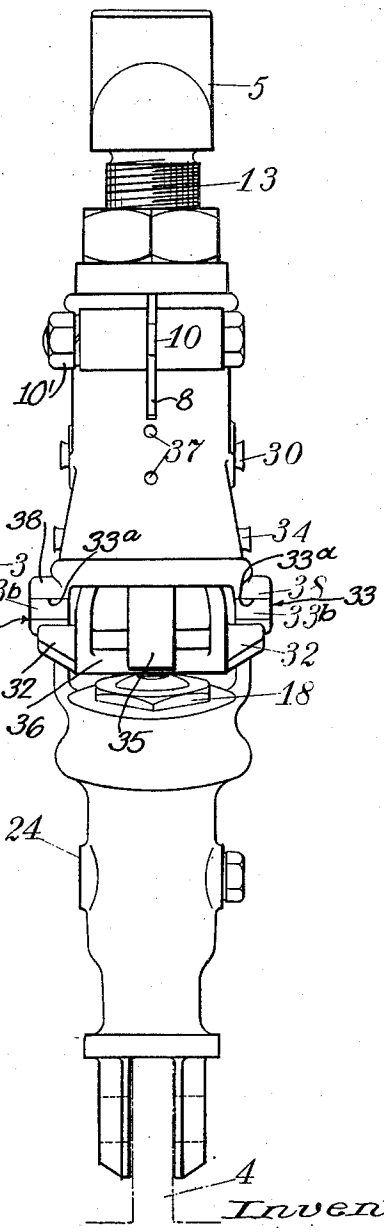


Fig. 1.

Fig. 2.



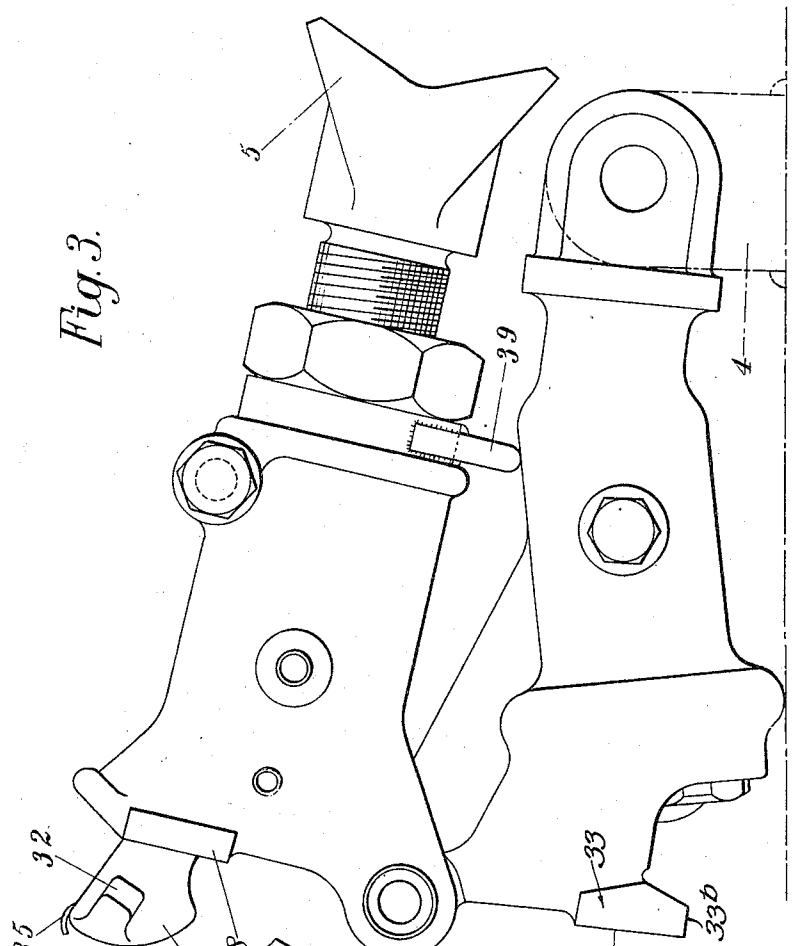
Inventor
N. Straussler
By Glascock Downing & Seibold
Attys

Oct. 10, 1950 N. STRAUSSLER 2,525,244

STRUT OR STAY

Filed May 10, 1945 2 Sheets-Sheet 2

Fig. 3.



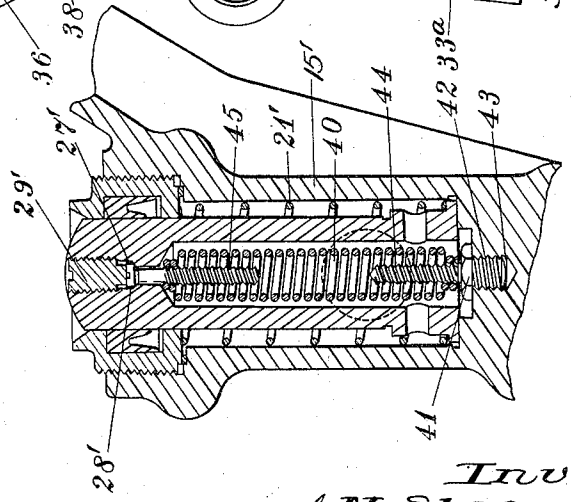


Fig. 4.

Inventor
N. Straussler
By Glascock Downing & Seibold
Attys.

Patented Oct. 10, 1950 2,525,244

UNITED STATES PATENT OFFICE

2,525,244

STRUT OR STAY

Nicholas Straussler, London, England

Application May 10, 1945, Serial No. 593,054
In Great Britain November 3, 1944

11 Claims. (Cl. 287—99)

1

This invention relates to struts or stays for supporting collapsible structures, of the kind comprising two arms or limbs hinged or pivoted together, one of which is pivoted or hinged to a stationary part or support and the other hinged or pivoted to or adapted to engage the structure, abutment means being provided which prevent further relative movement of the arms or limbs when they have been moved to in line or dead center position or just beyond said position.

Struts of the above kind are described in my prior British Patent Specification No. 580,881 and power operated means is provided to act on one of the limbs to effect their relative movement out of in line or dead center position to permit collapse of the structure and the invention is therein shown applied to amphibious vehicles for the support of a collapsible hull when the vehicle is being propelled on water as described in United States Patent No. 2,390,747.

Examples of such vehicles to which the invention may be applied are motor vehicles and tanks employed for military purposes.

The primary objects of the present invention are to provide an improved strut of the above kind in which the arms or limbs will be positively held in the in line or dead center position, whereby any movement of the structure, when supported by the strut, cannot cause relative movement of the limbs and power operative means associated with the strut in such a manner as to ensure the movement of the limbs out of line when it is desired to collapse the structure.

The invention consists in means for supporting collapsible structures in erected position comprising one or more struts or stays each having two arms hinged or pivoted together, the outer end of one arm being pivoted or hinged to a support or stationary part and the outer end of the other arm being pivotally connected to or adapted to engage the structure, and having abutment means to prevent further movement of the arms when they are in line or in dead center position or just beyond said position, wherein is provided power operated means carried by one of the arms and arranged to act on the other arm to move them out of said position to permit the structure to collapse.

Referring now to the accompanying drawings:

Figure 1 is a part sectional elevation, of a strut according to the invention,

Figure 2 is an elevation looking towards the right of Figure 1,

Figure 3 is an elevation showing the strut in folded position, and

2

Figure 4 is a part sectional elevation of a modification.

In carrying out the invention a strut, Figures 1 to 3, comprises two arms or limbs 1, 2, hinged or pivoted together on a tubular pin 3. The lower limb 1 is pivoted to a lug 4 projecting from a stationary part of the vehicle and the upper end of the upper limb carries a jaw 5 adapted to engage, beneath a rail 6, shown in broken lines of the collapsible structure. The upper limb 2 comprises a tubular member 7 flared at its lower end and having at its upper end a slot 8 and apertured lugs 9. The apertures have extending therethrough a bolt 10. Within the upper portion of this limb is an internally threaded adaptor sleeve 11 secured in position by the bolt 10 which fits in a groove 12 provided in the sleeve 11 to prevent its rotation, it being understood that by taking up on the nut 10' on the bolt 10 the sleeve 11 will also be tightly gripped within the upper end of the upper limb 2. The jaw 5 carries a threaded stem 13 which is adjustably screwed into the sleeve 11 more or less according to the height limit of the structure when in erected position, and the stem 13 is held in adjusted position by a lock nut 14. Thus the upper limb 2 can be adjusted as to length to suit the height limit above referred to it being understood that in the case of a collapsible hull of an amphibious vehicle which as described in my patent specification above referred to the adjustment will be such that the fabric will be taut when the strut is in the position shown in Figure 1.

The lower limb 1 has integral therewith a fluid pressure cylinder 15 having its axis inclined at an acute angle to the body of the limb. Slidably mounted within the cylinder is a piston or ram 16. The upper end of the cylinder has an internally threaded counterbore 17 in whch is screwed a gland 18 provided with a sealing ring 19, and seated on a washer 20. The piston is normally held in the position shown in Figure 1 by a spring 21 which surrounds the reduced upper portion 22 of the piston or ram 16. The latter is hollow and transverse ports 23 are provided which connect the interior of the piston with the space between the outer surface of the reduced part 22 of the ram or piston and the interior surface of the cylinder 15 so that liquid under pressure can act on the piston when it is in the position shown in Figure 1 to initiate its upward movement from the bottom of the cylinder, the liquid under pressure being supplied to the cylinder through an inlet connection 24. The head 25 of

the piston is provided with bleed means 26, comprising a counterbored passage 28, a ball 27 seating against a seat provided at the lower end of the counterbore and a screw 29 for holding the ball seated.

This bleed means is for the purpose of permitting escape of air from the cylinder to the atmosphere when it is being initially filled with liquid through the connection 24, it being understood that after filling the screw 29 is rotated until it engages the ball so as to hold the latter on the seat at the lower end of the counterbore.

The upper limb 2 has pivoted therein on a transverse pin 30, a latch in the form of a yoke 31 having lateral locking lugs 32 which co-operate, when the parts are in the positions shown in Figure 1, with lugs 33 having plane upper abutment surfaces 33*a* and side surfaces 33*b*, the lugs 33 projecting laterally from the upper end of the lower limb to lock the limbs from relative movement. The yoke is held in locking position against a transverse stop member 34 by means of a curved leaf spring 35 which bears at its lower end on the transverse portion 36 of the yoke and is secured at its upper end within the upper limb by rivets 37. The upper limb also has integral therewith lateral abutments 38 having plane lower abutment surfaces which engage the abutment surfaces 33*a* of the lugs 33 positively to prevent further movement of the limbs after they have been moved to the line position of Figure 1. The abutments 38 and the lugs 33 thereby constituting additional stop members to positively prevent further pivotal movement of the arms past an in-line position.

The upper limb carries a stop plate 39 adapted to engage the lower limb as shown in Figure 3 to limit pivotal movement of the arms 2 inwardly towards the arm 1.

To collapse the structure supported by the strut, liquid under pressure is supplied to the cylinder through inlet connection 24. Referring particularly to the drawings the liquid under pressure will flow through the ports 23 and act on the interior downwardly facing surface 16*a* of the piston 16 so as to initiate upward movement thereof. When the piston has moved upwardly away from the bottom of the cylinder the liquid under pressure will also act on the lower surface 16*b* of the piston.

Upward movement of the piston after its engagement with the transverse member 36 of the pivoted latch moves the latter clockwise, Figure 1, about the axis of the pivot pin 30, tensioning the spring 35, thus moving the lateral lugs 32 from locking engagement beneath the lateral lugs 33 on the lower limb whereby the limbs are released for relative movement. The piston continues its outward movement, acting on the part 36 so that the shank of the latch or yoke engages the inner surface of the limb 2 and thereby transmits pressure thereto to effect relative movement of the limbs 1 and 2 until the latter are moved to an out of line position when the structure and the limbs 1 and 2 collapse the latter finally occupying the positions shown in Figure 3. The supply of liquid under pressure will then be discontinued, and the pressure in the cylinder relieved when the piston will be moved to its innermost position in the cylinder by the spring 21.

During extension of the strut from the collapsed position shown in Figure 3 to the in-line position shown in Figure 1, the lugs 32 first engage and then ride to the left, Figure 1, on the abutment surfaces 33*a* of the lugs 33. The latch

36 moves clockwise about its pivot pin 30 against the action of the spring 35. On continued movement the lugs 32 then ride downwardly over the side surfaces 33*b* of the lugs 33 until the lugs 32 are below the level of said surfaces 33*b*, whereupon the spring 35 moves the latch counterclockwise, Figure 1, about the pin 30 so that the lugs 32 are moved to locking position beneath the lugs 33.

Referring to Figure 4 the piston or ram 16 is provided with an interior spring 40, which is tensioned when the ram moves outwardly from the position shown in the figure, and aids the spring 21' in returning the piston or ram to inward position.

The interior spring 40 is anchored at its lower end to the base of the cylinder 15' by a double ended screw 41 which has a lower screw threaded portion 42 which fits in a threaded bore 43 in the lower end of the cylinder and an upper screw-threaded stem 44 which engages smaller diameter coils of the lower end of the spring 41. The upper end of the spring 41 has similar smaller diameter coils engaged by a headed screw 45, and the bevelled under surface of the head of this screw normally engages a seat 28' to close the counterbored passage 27'. The screw 29' holds the head of the screw 45 in seated position and is removed during filling of the cylinder and the interior of the piston with liquid to permit escape of air in the piston and cylinder to atmosphere.

I claim:

1. A collapsible strut comprising two pivotally inter-connected arms, a latch movably mounted on one of said arms, means fixed to the other arm and cooperable with said latch when the arms are in extended position to prevent pivotal movement of the arms relative to each other, said second arm having a fixed cylinder thereon, a piston slidably mounted in said cylinder and responsive to fluid pressure supplied to the cylinder to directly engage and operate said latch to release the same from engagement with said means and then to effect pivotal movement of the arms relative to one another for collapsing the strut.

2. A collapsible strut as defined in and by claim 1 wherein the latch is mounted for movement relative to the arm on which it is mounted in such a manner that after it has been disengaged from said means carried by said second mentioned arm it moves to a position in engagement with the arm on which it is mounted so that further movement of the piston is transmitted through the latch directly to the arm carrying the same to thereby effect said relative movement of the arm.

3. A collapsible strut as defined in and by claim 1 wherein the latch is pivotally mounted at one of its ends to said first mentioned arm and wherein the axis about which the arms pivot relative to each other and the pivotal axis of the latch are parallel to one another, said latch having locking lugs at its other end and said means consists of lugs carried by said second mentioned arm.

4. A collapsible strut as defined in and by claim 3 wherein spring means are provided to hold the latch in locking engagement with said means, said locking lugs and said lugs on the other arm having surfaces which cooperate with one another during movement of the arms to extended position in such manner that the latch is first moved about its pivotal axis against the action of said spring means and is then moved about its pivotal

axis by the action of said spring means until the latch is moved to locking position.

5. A collapsible strut as defined in and by claim 1 wherein spring means are provided for returning the piston to inoperative position in said cylinder when pressure on said piston is relieved.

6. A collapsible strut as defined in and by claim 1 and a stop member carried by said first mentioned arm and disposed in the path of movement of said latch and engageable thereby when the arms are in extended position to prevent movement of the latch past a position assumed when the arms are locked in extended position.

7. A collapsible strut including two arms pivotally interconnected at adjacent ends thereof, one of said arms having a tubular portion adjacent the axis about which the arms pivot, a latch pivotally mounted within said tubular portion about an axis parallel to the pivotal axis of said arms, said latch including a yoke member having a portion projecting beyond the tubular portion and exteriorly thereof and said projecting portion having laterally extending locking lugs thereon, lugs carried by said other arm exteriorly thereof and disposed in the path of movement of the lugs on said latch when said arms are moving from collapsed to extended position, said lugs on said other arm having surfaces cooperable with said lugs on said latch and when said arms are extended said surfaces comprise a surface disposed perpendicular to a plane passing through the pivotal axis of the arms and parallel to the longitudinal axis of the arm mounting the latch, a surface disposed at right angles to said first mentioned surface and a locking surface disposed at an angle with respect to said second mentioned surface and beneath the first mentioned surface whereby in extending such strut the lugs on said latch ride over said first and second mentioned surfaces and engage beneath the third mentioned surfaces, resilient means normally biasing said latch to hold the lugs thereon in locking engagement with said third mentioned surfaces when the arms are in extended position and fluid pressure responsive means carried by said second mentioned arm and cooperable with said latch to move the same about its pivotal axis against the action of said biasing means to disengage the lugs of the latch from beneath the third mentioned locking surfaces of the lugs on said second arm whereby the arms are released for collapsing pivotal movement relative to one another and additional movement of said latch engaging the same with the inner surface of the tubular portion of the first mentioned arm adjacent said latch whereby continued force exerted by said pressure responsive means maintains the latch in engagement with said inner surface to positively effect pivotal movement of said arms from extended position toward the collapsed position.

8. A collapsible strut as defined in and by claim 7 and a stop member carried by said first mentioned arm and disposed beneath the pivotal axis of said latch, in the path of movement thereof and engageable by the latch when the same has reached its locking position to positively prevent movement of said latch past a locking position.

9. A collapsible strut as defined in and by claim 7 wherein said fluid pressure responsive means comprises a cylinder extending at an acute angle with respect to the longitudinal axis of said arms when they are in extended in-line position and a piston slidably mounted therein and directly engageable with said latch to move the same.

10. A collapsible strut as defined in and by claim 1 and a stop member carried by the arm on which the latch is mounted, a stop member carried by said other arm and disposed in the path of movement of said first mentioned stop member and engageable thereby when said arms are moved from a collapsed to an extended position to positively prevent over movement of the arms past an in-line position.

11. A collapsible strut as defined in and by claim 7 and abutments carried exteriorly of said arm on which the latch is mounted and each having a lower planar surface extending perpendicular to the axis of said arm, said first mentioned surface on the lugs carried by said other arm being in the path of movement of said abutments when the arms are moved from a collapsed to an extended position and engageable by said lower planar surfaces to positively prevent over movement of the arms past an in-line extended position.

NICHOLAS STRAUSSLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,359,554	Griswold	Oct. 3, 1944
2,363,667	Griswold	Nov. 28, 1944

FOREIGN PATENTS

Number	Country	Date
124,363	Great Britain	Mar. 27, 1919
131,071	Great Britain	Aug. 21, 1919
217,304	Great Britain	June 12, 1924