Nov. 2, 1948. F. N. DICKERMAN 2,452,911

ARRESTING HOOK

Filed Jan. 8, 1946

2 Sheets-Sheet 1

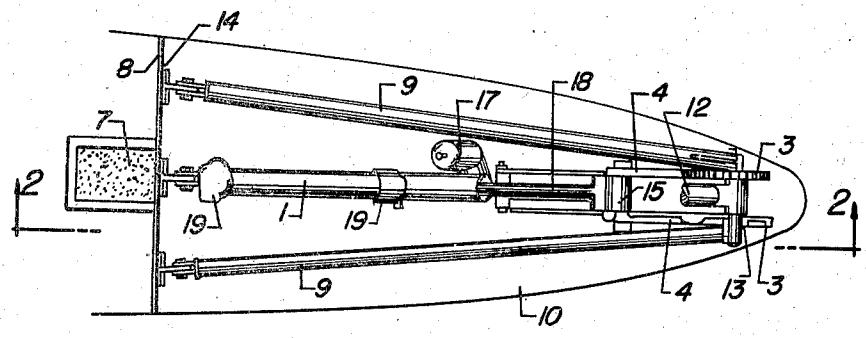


Fig. 1

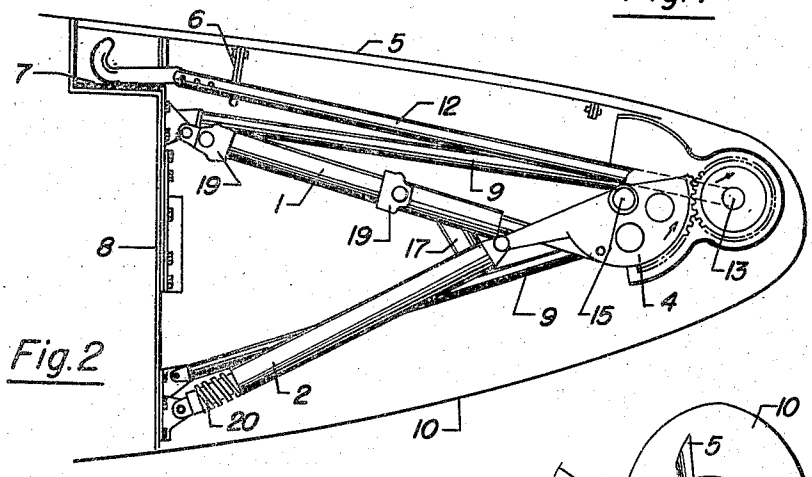


Fig. 2

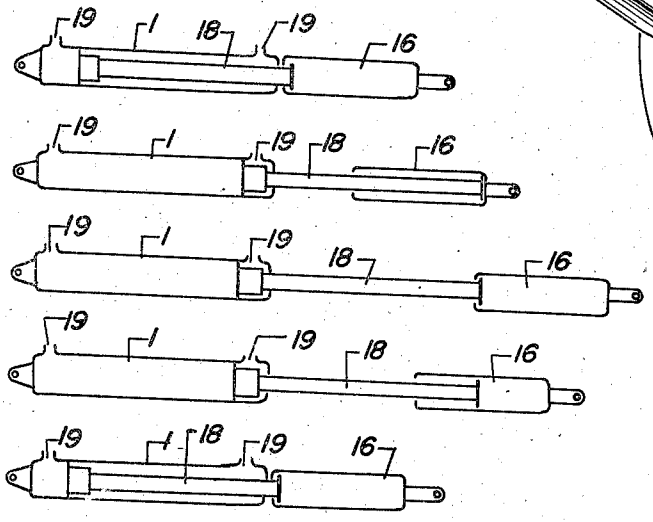


Fig. 3

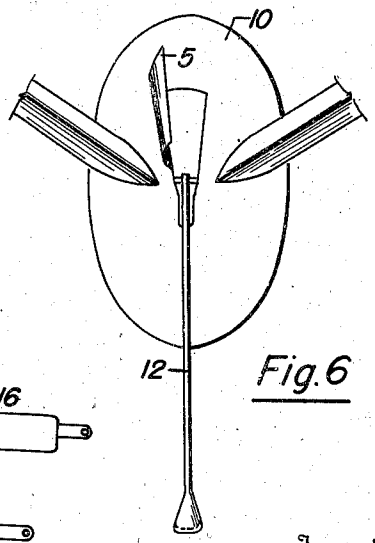


Fig. 6

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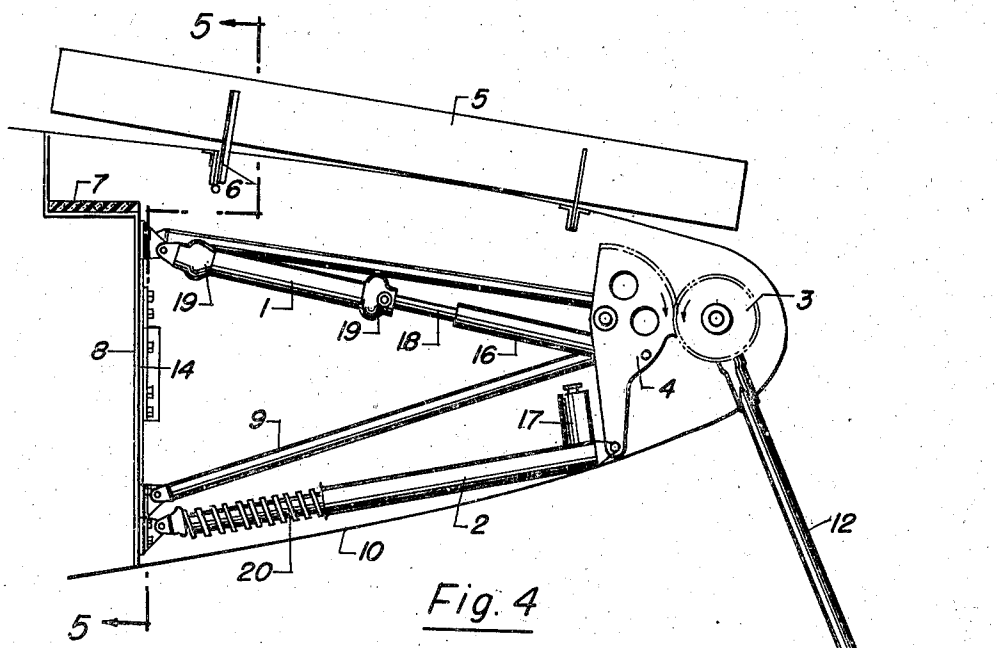


Fig. 4

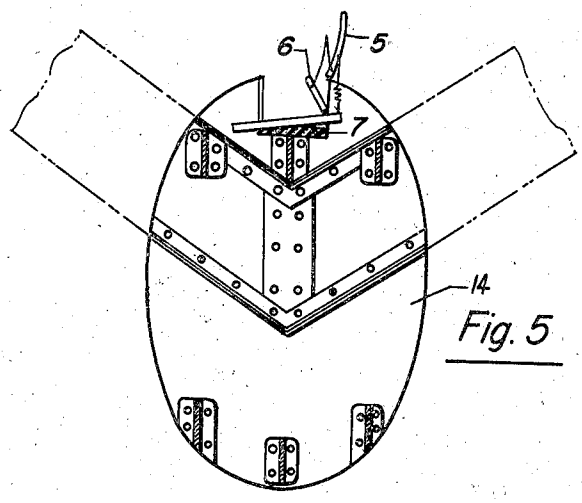


Fig. 5

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ARRESTING HOOK

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8 Claims. (Cl. 244—110)

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My invention relates to hooks for arresting the motion of airplanes and specifically to an arresting hook adapted to be stowed in the top of a tail cone housing when in its inoperative position. A hook stowed in this manner is particularly adapted to use in V-tail airplanes but obviously is not entirely limited to such use.

One object of my invention is to provide a simple pivoting device to supplant the conventional, mechanically complex, and heavy track mechanism normally used to effect release and retraction of arresting hooks.

A further object is to provide an arresting hook housed in the top of the plane structure rather than in the bottom thus doing away with the danger of hooks dropping and catching obstructions during take-offs or landings on shore stations. Such dropping of hooks during take-offs over areas equipped with arresting gear generally causes the engagement of the arresting gear by the arresting hook and stoppage of the plane with possible injury to personnel and/or equipment.

Further advantages accomplished by this invention are in the provision of a simple means of storing the arresting hook in an inoperative position in an automatically closable recess provided for the purpose and in the provision of a high point of attachment for the arresting hook, thus reducing the undesirable characteristic of tail rise ordinarily present in conventional arresting hook installations.

Still further advantages will appear from time to time throughout the specification and claims.

It is to be understood that the form of this invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of this invention, or the scope of the subjoined claims.

Referring to the drawings:

Figure 1 is a plan view with the tail cone removed and showing the structure as it appears with the hook in the inoperative position and with the hook itself broken away to better show the relation of the parts.

Figure 2 is a side elevational view taken along the line 2—2 of Figure 1 but showing in addition the entire hook, the enclosing door and the door operating means.

Figure 3 is a schematic representation of the operation of the hydraulic retracting strut.

Figure 4 is a view similar to Figure 2 but showing the hook in operative position.

Figure 5 is a section along the line 5—5 of Figure 4 and particularly shows the door operating means and the means for securing the entire tail and hook structure to the fuselage.

Figure 6 is a rear view of an airplane tail structure showing my invention in its operative position.

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Like parts are indicated by like characters throughout the specification and drawings.

The tail cone 10 has its forward bulkhead 14 secured to the after fuselage bulkhead 8 by means of bolts as shown in Figure 5. The hook 12 is keyed to ring gear 3 which is pivoted on a transverse axis 13 mounted at the convergent extremities of four structural supporting members 9 which have their forward ends bolted to the aft side of bulkhead 14. Mounted on transverse axis 15, forward of gear 3, and so as to be in engaging relationship therewith is a gear sector 4 which functions to rotate gear 3, thus raising and lowering the hook 12. Pivoted at its forward end to bulkhead 14 and at its aft end to an arm protruding from gear sector 4 is a conventional damping strut 2 containing a dashpot arrangement, to dampen the bounce of the hook 12, and a heavily compressed spring 20 for expansion of the two parts. In the embodiment shown, the chamber 17 for loading the strut is placed off center, as best shown in Figure 1, to allow unobstructed movement of the parts of my invention.

To provide gear sector 4 with initial movement, the design includes a hydraulic retracting strut. This strut comprises the actuating cylinder which contains the piston 18. The piston rod of piston 18 has concentric therewith a freely moving sleeve 16, the aft extremity of which is fixed to a point on the periphery of the gear sector 4. The forward end of the actuating cylinder is pivoted to bulkhead 14. Inlet ports 19 are provided for connection with the hydraulic system of the airplane in the conventional manner.

The construction further includes at 7 a sponge rubber pad beneath the hook in stowed position to prevent rattling and to keep the hook snug. In the top surface of the easily removable tail cone 10 is a hinged door 5 possessing a protruding linkage 6 which closes the door upon stowing the hook by reason of engagement of the hook shank with the door linkage. The door is opened by the hook shank. Linkage 6 is spring loaded so as to keep the door in an open position until the hook pulls it closed.

Figure 3 represents, schematically, various positions of the parts of the hydraulic retracting strut for the various conditions incident to the operation of my invention. When the hook is in stowed position, the hydraulic retracting strut is in the position indicated in the top sketch of Figure 3, the piston being retracted in the cylinder and the sleeve 16 being in its forwardmost position, as seen in Figures 1 and 2. As hydraulic pressure is applied against the piston head by admission of hydraulic fluid into the forward chamber of the cylinder, the piston rod carrying the sleeve with it extends to the position shown in the

second sketch. This motion rotates the gear sector 4 until the damping strut is on the opposite side of the sector center, at which time the compressed spring on the damping strut expands, lowering the hook to its deck engaging position. This motion carries the sleeve 16 on the piston rod of the actuating cylinder to the position shown in the third sketch and as can be seen in Figure 4. Pressure of spring 20 keeps the arresting hook down in engaging position but bouncing of the hook would result in the sleeve 16 assuming some intermediate position such as that shown in the fourth sketch. The hook is placed in its stowed position by the obvious means, as indicated in the fifth sketch of Figure 3, of admitting hydraulic fluid to the opposite chamber of the hydraulic retracting strut, causing the piston rod to retract in the cylinder and carrying sleeve 16 with it, which motion rotates the gear sector 4 clockwise, causing gear 3 to which the hook is keyed to rotate counter-clockwise. As the hook reaches its fully stowed position, it engages the linkage on door 5 and closes that door behind it, being locked in stowed position by the damping strut 2 which has again rotated past the center point of gear sector 4.

From the foregoing it will be apparent that a simple, pivotally acting arresting hook is provided and one which is housed in the top of the tail cone structure. This arrangement provides added safety and simplicity of operation.

What I claim is:

1. An arresting hook mechanism for airplanes comprising a frame member adapted to be attached to an airplane, a ring gear, supporting means interposed between said frame member and said ring gear, an arresting hook keyed to said ring gear, a gear sector in engagement with said ring gear, and means to rotate said gear sector thereby causing pivotal movement of said arresting hook.

2. An arresting hook mechanism for airplanes comprising a frame member adapted to be attached to an airplane, a ring gear, supporting means interposed between said frame member and said ring gear, an arresting hook keyed to said ring gear, a gear sector in engagement with said ring gear, and means to rotate said gear sector thereby causing pivotal movement of said arresting hook, said means comprising a hydraulic actuating strut pivotally attached to said frame member and to said gear sector.

3. An arresting hook mechanism for airplanes comprising a frame member adapted to be attached to an airplane, a ring gear, supporting means interposed between said frame member and said ring gear, an arresting hook keyed to said ring gear, a gear sector in engagement with said ring gear, a hydraulic actuating strut pivotally attached to said frame member and to said gear sector, and means for damping movement of said arresting hook.

4. An arresting hook mechanism for airplanes comprising a frame member adapted to be attached to an airplane, a ring gear, supporting means interposed between said frame member and said ring gear, an arresting hook keyed to said ring gear, a gear sector in engagement with said ring gear, a hydraulic actuating strut pivotally attached to said frame member and to said gear sector, and a damping strut, said damping strut comprising a piston pivotally attached to said

frame member, a cylinder member attached to said gear sector, and a spring so placed around said piston as to be compressed by movement of said piston.

5. An arresting hook mechanism for airplanes comprising a frame member adapted to be attached to an airplane, a ring gear, supporting means interposed between said frame member and said ring gear, an arresting hook keyed to said ring gear, a gear sector in engagement with said ring gear, an extension arm on said gear sector, a hydraulic actuating strut pivotally attached to the periphery of said gear sector and to said frame member and a damping strut pivotally attached to said extension arm and to said frame member and adapted to lock said arresting hook in each of its limiting positions and to dampen movement of said hook due to bouncing.

6. A tail cone adapted to be attached to an airplane, an elongated opening in the top of said tail cone, an arresting hook pivotally mounted in said tail cone and means to cause pivotal motion of said arresting hook through said elongated opening and into operative and stowed positions.

7. A tail cone adapted to be attached to an airplane, an elongated opening in the top of said tail cone, a door hinged to said tail cone and adapted to close said elongated opening, an arresting hook pivotally mounted in said tail cone, means to cause pivotal motion of said arresting hook through said elongated opening and into operative and stowed positions and cooperating means on said tail cone and on said door adapted to open said door when said arresting hook is caused to move out of said tail cone and to close said door when said arresting hook is caused to move into said tail cone.

8. An arresting hook mechanism for airplanes comprising a frame member adapted to be attached to an airplane, a ring gear, supporting means interposed between said frame member and said ring gear, an arresting hook keyed to said ring gear, a gear sector in engagement with said ring gear, an extension arm on said gear sector, a lidded compartment inset in the upper surface of said airplane, spring-loaded means connected to the lid of the said compartment for opening and closing said lid upon the release and stowage of said arresting hook, a hydraulically actuated strut pivotally attached to the periphery of said gear sector and to said frame member, and a damping strut pivotally attached to said extension arm and to said frame member, said damping strut including a spring means cooperating with said extension arm and said frame member to snap to one side or the other of said extension arm pivot, on the one side to lock said arresting hook in stowage position in said compartment and on the other side to hold said arresting hook in operative position.

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