

## Chapter 3

# SEAT STRUCTURE, OBSERVER'S SEAT ANGLE MECHANISM AND GUIDE RAILS

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### SEAT STRUCTURE

1. The seat structure (*fig. 1*) is made almost entirely of light alloy. The main frame is a fabricated three-sided box structure bridged at the top by a cross-beam which receives the thrust of the ejection gun piston. The base of the structure carries the seat raising mechanism and four guide slippers which engage with the guide rail. The front of the seat structure carries the parachute pack support bracket and the harness release operating plunger; the release linkage associated with the barostatic time-release unit is fitted on the starboard side.

2. The seat pan (*fig. 2*) is supported on the seat raising levers on the countershaft and slides on four runners. The thigh straps of the safety harness are attached to the seat pan which incorporates the manual release lever on its port side. The weight of the occupant is counterbalanced by two direct acting elastic cords (*fig. 3*). A housing for the alternative firing handle and two snubbing units are borne on the front edge of the seat pan.

3. The snubbing units are both similar in construction but are handed. Each unit consists of a casing which incorporates a slot through which is passed one of the leg restraining cords. The casing houses a snub lever (*fig. 4*), a spring tube and a release button. The object of the snubbing unit is to allow the nylon cord to pass freely *downwards* through the unit, but to lock the cord against any movement *upwards*. Thus, during ejection, the cords which are anchored to the aircraft floor pull taut and automatically bring the occupant's legs backward and together. The lower ends of the cords are anchored by means of dead-eyes and brackets; the dead-eyes are held in the brackets by light alloy rivets which are stressed to shear at 400 lb. Since the cords cannot pass upwards through

the snubbing units, the occupant's legs are prevented from being blown apart by the airstream and are restrained in this position until the safety harness is released. When this occurs, the upper loops of the cords are pulled through the D-rings at the rear of the calf straps, so freeing the legs. The release button is provided on each unit to enable the occupant to adjust the cords to give comfortable leg movement during flight conditions.

4. The seat raising mechanism (*fig. 5*) is operated by the seat raising handle which is secured to the countershaft. Depressing the trigger control actuates a bell crank which, through a connecting rod, withdraws the plunger from the seat securing strip. The weight is now supported on the connecting links and the seat is free to be raised or lowered against the action of the elastic cords. When the desired position is reached, releasing the trigger control will cause the plunger to occupy the nearest hole in the securing strip under the action of its return spring.

5. The drogue container (*fig. 6*) is a riveted sheet metal box mounted at the top of the seat structure. The firing handle is attached to the front edge of the face screen and retained by two spring-loaded plungers. The face screen is retained in the container by two nylon cords which pass through conduits and secured at the rear by two pins. The pins themselves are withdrawn by the lifting lines after the scissor shackle has opened, so freeing the face screen and firing handle. The face screen, which is normally retained folded in the front compartment of the drogue container, is made of lined canvas and is specially shaped to protect the occupant's face from the air stream and to provide support for his head by preventing it jerking forward during ejection.

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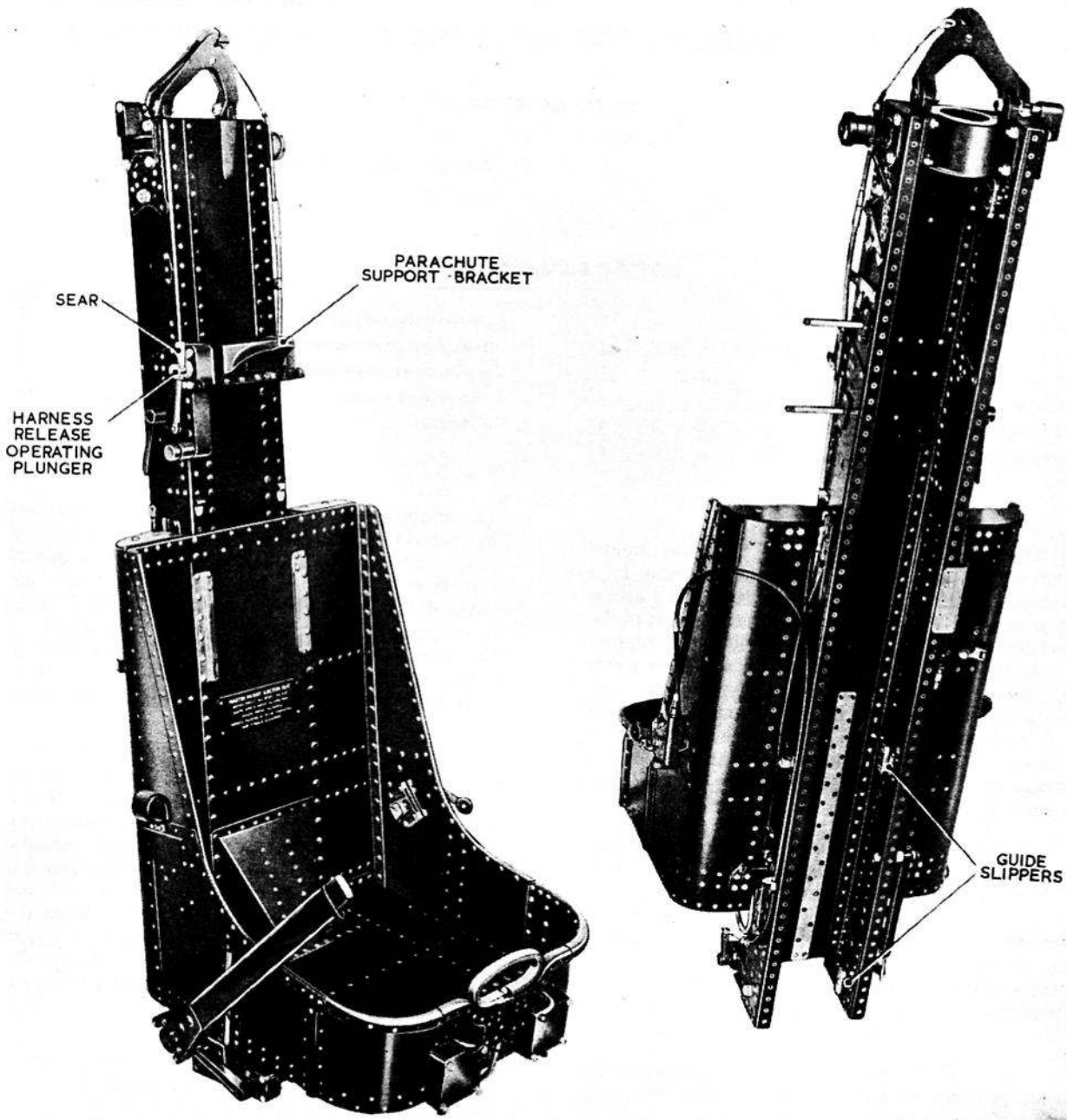


Fig. 1. Seat structure

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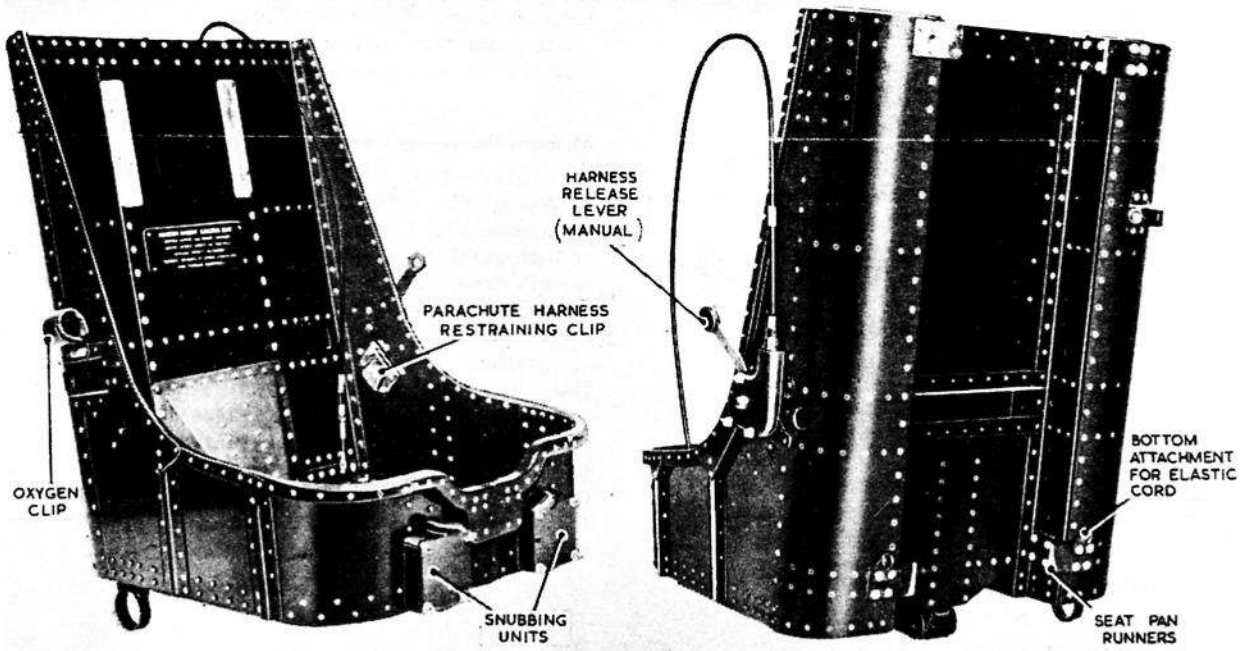


Fig. 2. Seat pan

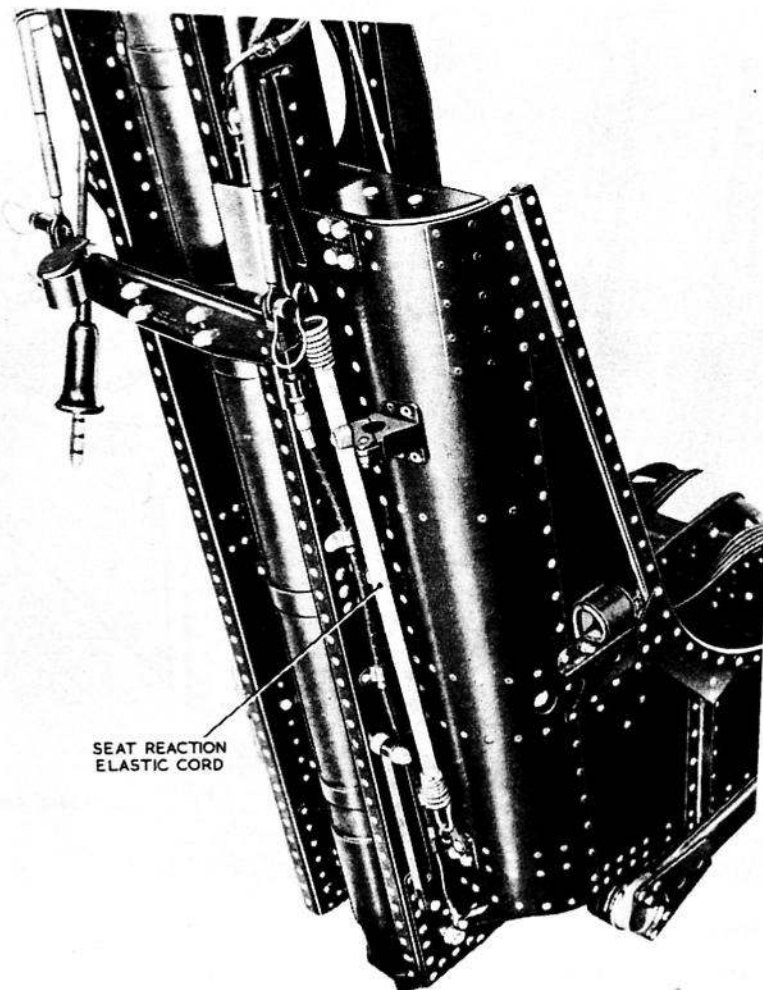


Fig. 3. Seat reaction cord

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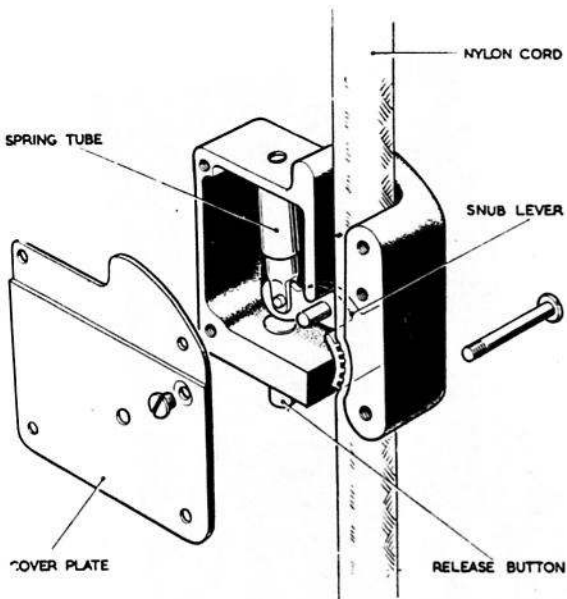


Fig. 4. Details of snubbing unit

6. The top of the drogue container is closed by four fabric flaps which normally retain the drogues in their stowage. The flaps are numbered 1 to 4 in the order rear, port, starboard and front. They are threaded on to a cone and locked by a pin.

#### Barostatic time-release unit

7. This unit (*fig. 7*) is mounted at the top of the starboard side of the seat structure and is provided to release the drogue connection from the scissor shackle and to release the safety harness. It incorporates a spring-loaded harness plunger which actuates the previously mentioned releases. A second plunger, which embodies a rack, is in engagement with a train of gears. It is retained in the cocked condition by a small arm projecting from the sear and which engages with the rack teeth; the sear is prevented from rotating by the firing pin. The gear train is regulated by an escapement which is governed by a barostat. A static rod to withdraw the firing pin is connected to the bracket on the guide rail.

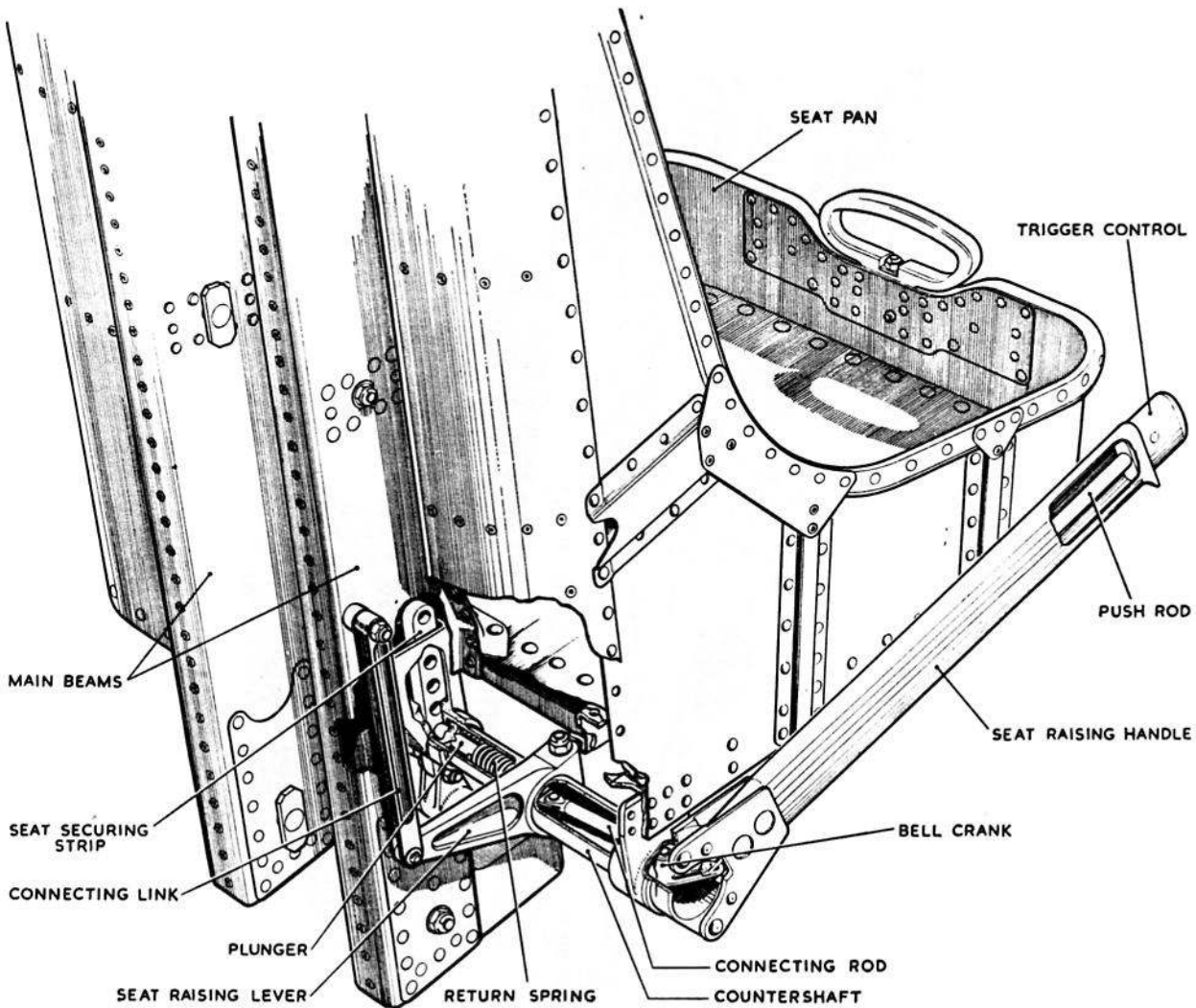


Fig. 5. Seat raising mechanism

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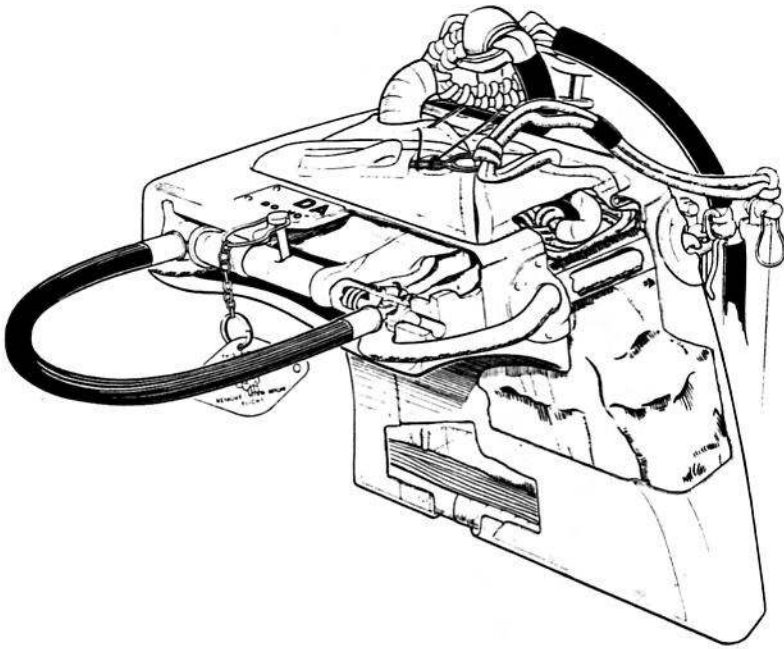


Fig. 6. Drogue container

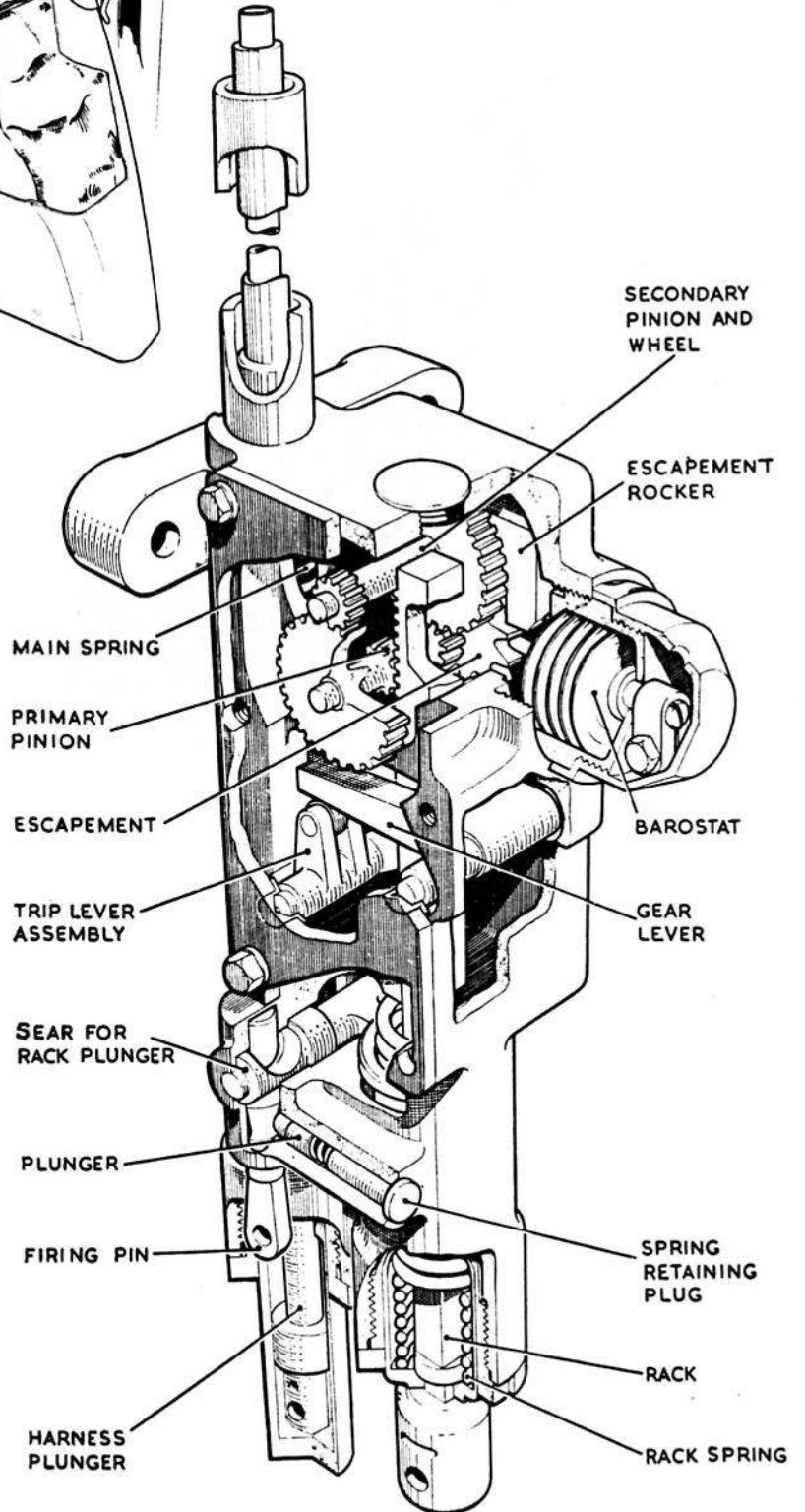


Fig. 7. Barostatic time-release unit

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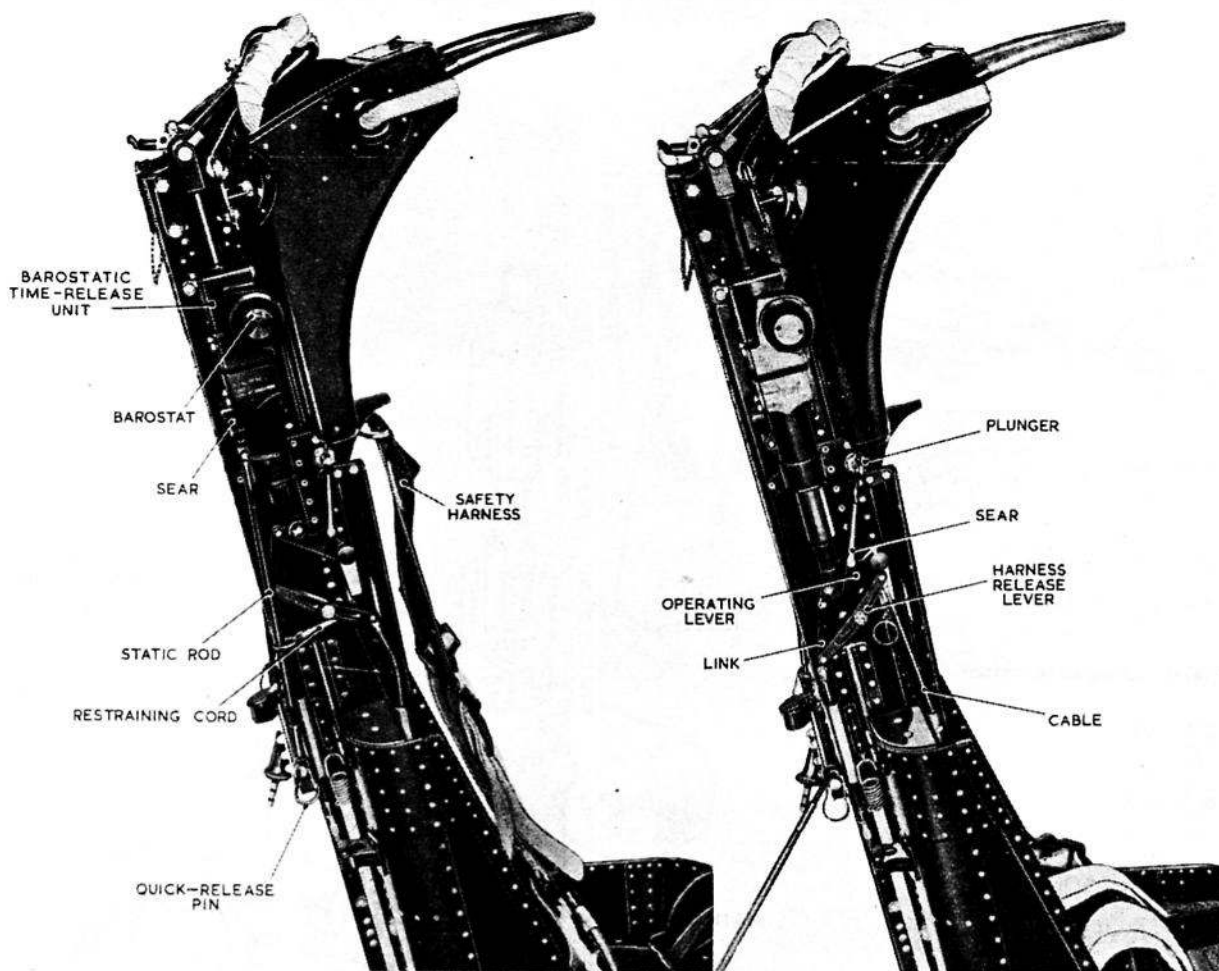


Fig. 8. Action of barostatic time-release unit

8. A peg on the innermost capsule of the barostat remains in engagement with the escapement, thus preventing automatic release of the occupant from the seat, until a safe altitude is reached, i.e., where the effects of anoxia and low temperature have negligible effect; this is at approximately 10,000 ft. On reaching this altitude, the restraint imposed on the escapement, and consequently the time-release mechanism, is removed thus allowing it to function and effect release of the occupant from the seat.

#### Principle of operation

9. As the seat ascends the guide rail, the static rod withdraws the firing pin from the sear. The sear rotates and allows the rack plunger (which is under spring compression) to descend and actuate the gear train. After 3 sec., immediately the rack overruns the pinion, the gear lever frees the trip lever assembly and allows the harness plunger to descend under the action of the main spring. When the harness plunger descends, it rotates the operating lever (fig. 8), frees the scissor shackle and withdraws the sear from the harness release plunger simultaneously. In rotating, the operating lever depresses a link which in turn rotates the harness release lever. The cable which operates the safety harness quick-release fitting is pulled and the shoulder and thigh straps are freed.

10. The withdrawal of the harness plunger frees the specially-shaped D-ring and so the upper ends of the harness shoulder straps are released also. The scissor shackle opens so releasing the drogue shackle, the lifting lines tighten and withdraw the quick-release pins, so freeing the firing handle and face screen. The seat occupant is now only retained in the seat pan by two spring clips and, when the parachute develops, the weight of the seat disengages these so allowing the seat to fall clear with no danger of it falling on, or becoming entangled with, the parachute canopy or rigging lines.

#### OBSERVER'S SEAT ANGLE MECHANISM

11. The Observer's seat is retained at the top by a hinged arm bolted to a fitting on the bulkhead. The operating portion of the hinge mechanism consists of a spring reaction mechanism, a compression strut and a hook which retains the seat in the rearward position until freed by the snatch unit. As shown in fig. 9, the gun and guide rail are shown hinged forward in the ejection position with the swivel arm and link in the over-centre condition which locks the seat forward positively. When in normal flight conditions, the hook bolt is retained by the hook, the hinge arm and link are swung downwards and the spring reaction mechanism and the strut are in compression.

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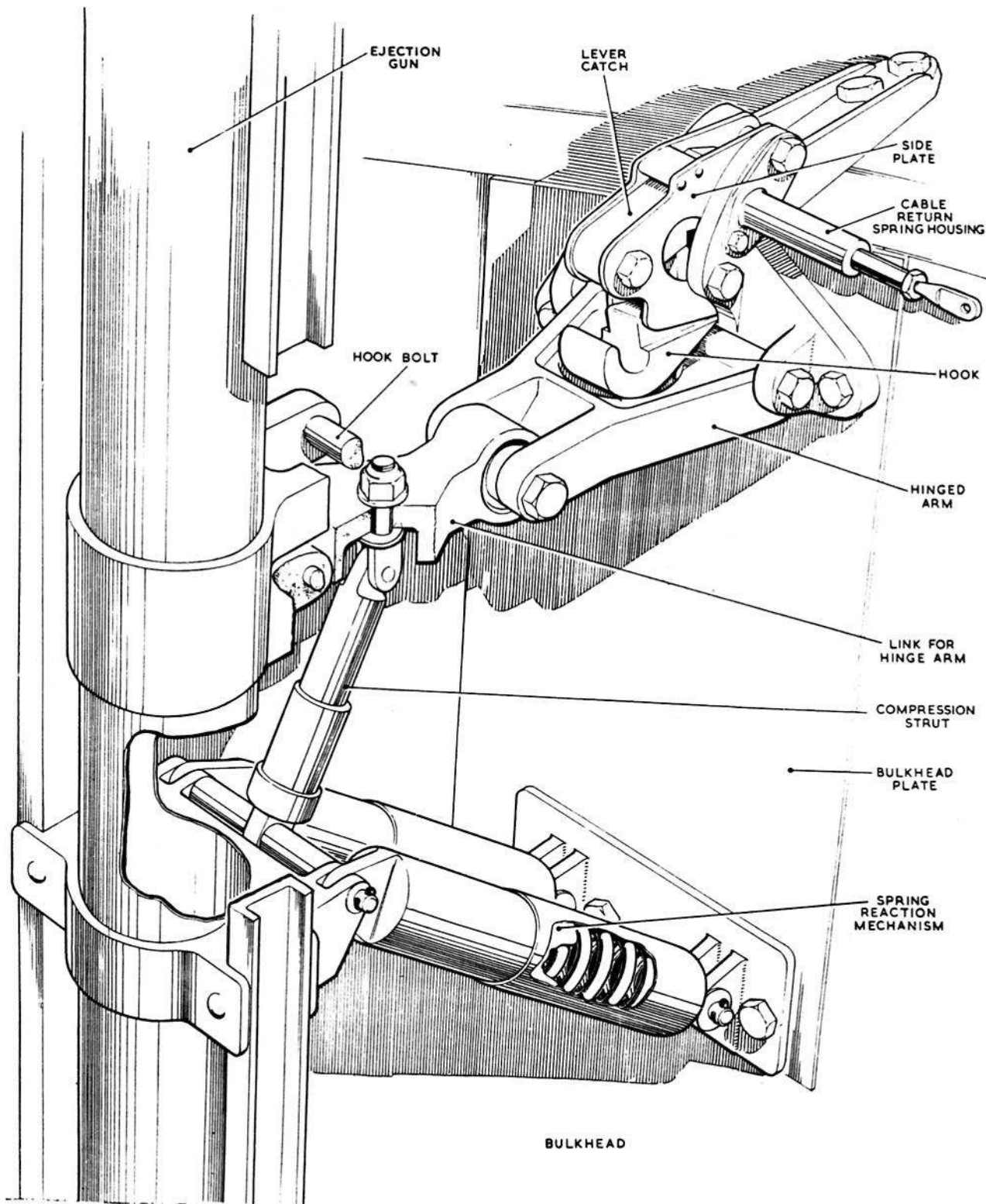


Fig. 9. Observer's seat angle mechanism

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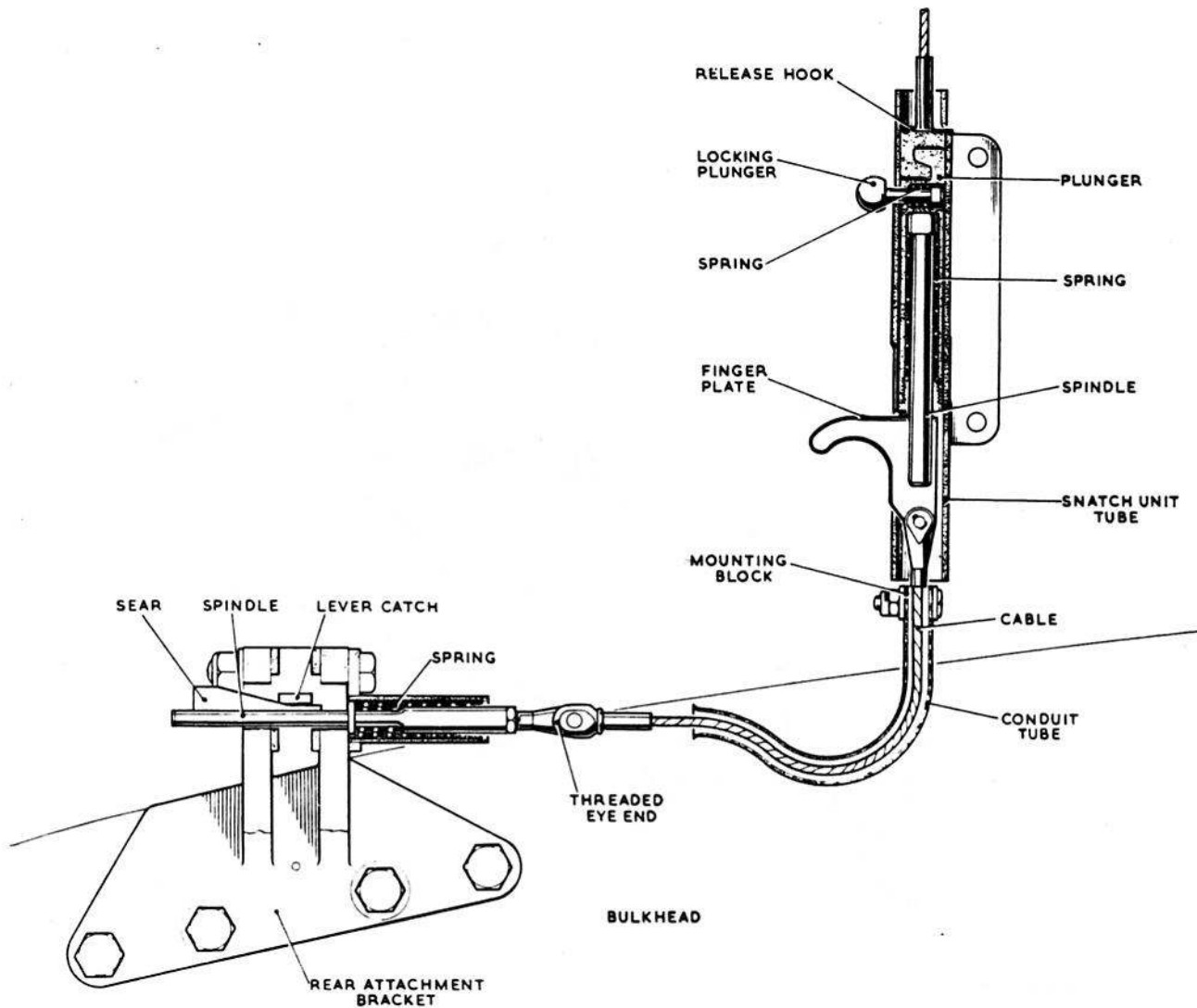


Fig. 10. Action of snatch unit

12. When the canopy is jettisoned the interconnecting cable withdraws a release hook from engagement with the plunger and then pulls free. The operating plunger is prevented from returning by the locking plunger (*fig. 10*). The movement of the plunger is reacted on a cable which withdraws the sear. This, in turn, raises the lever catch which releases the hook and allows the seat and occupant to move forward to the ejection position under the action of the spring reaction mechanism and the compression strut. For servicing purposes, when it is desired to bring the seat forward, a finger plate is incorporated in the snatch unit. Moving the finger

plate upwards disengages the hook without disturbing the release hook and operating plunger.

#### GUIDE RAILS

13. Each guide rail (*fig. 11*) consists of two single extrusions riveted to a number of fittings integral with the ejection gun. Bolted to the rear of the guide rail is a bracket to which the static rods for the drogue gun and barostatic time-release unit are connected by quick-release pins. Each bracket also embodies a housing for the intercom. lead quick-release jack.

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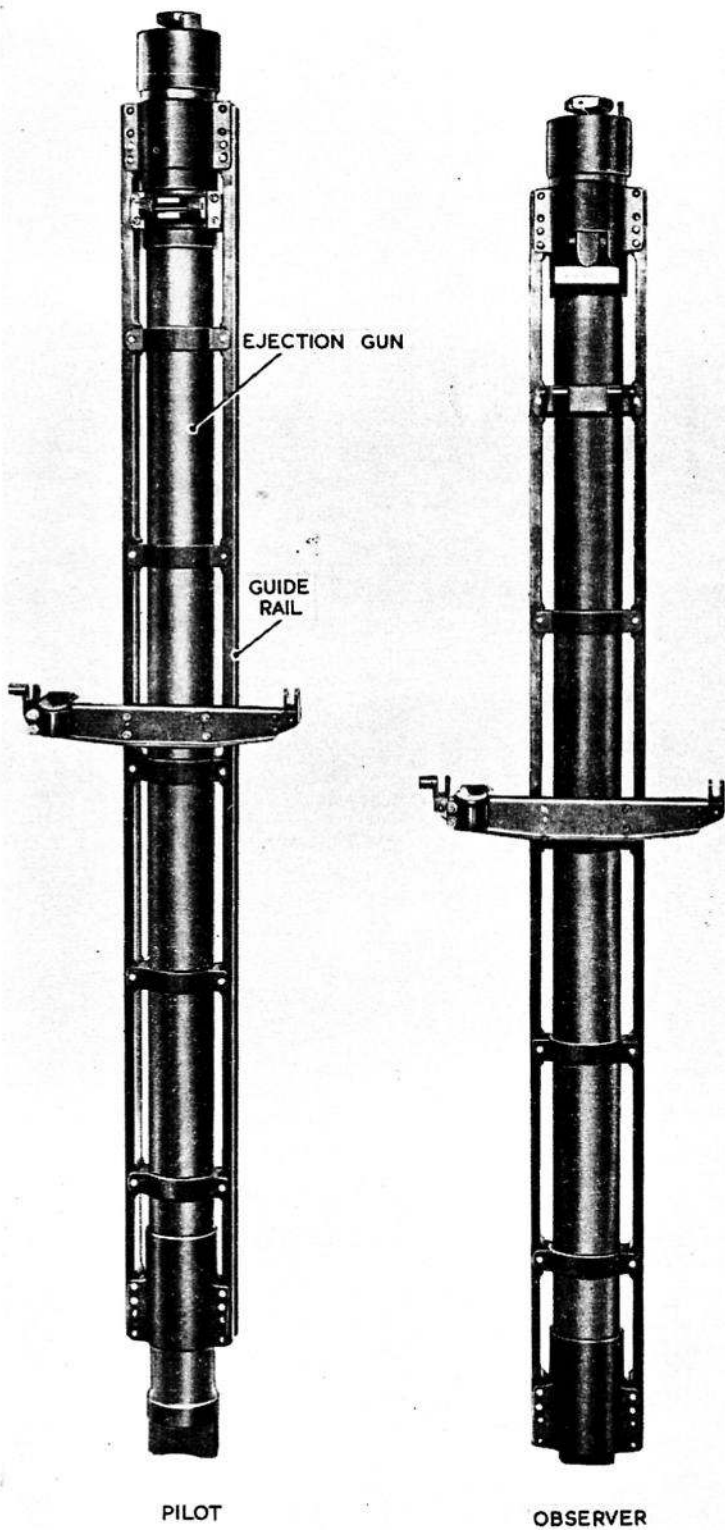


Fig. 11. Guide rails

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