

Chapter 3

SEAT STRUCTURE AND GUIDE RAIL

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SEAT STRUCTURE

1. The seat structure (*fig. 1*) is made entirely of light alloy. The main frame is built up from a pair of side beams connected at the top by a cross-beam which receives the thrust of the ejection gun piston, and at the bottom by a distance tube through which passes the countershaft carrying the seat raising levers and handle and the footrests.

2. Each side beam carries at its lower end two of the rollers which engage with the guide rail. The upper rollers leave the top of the guide rail at the moment that the piston tube emerges from the cylinder tube at the end of the ejection stroke.

3. The seat pan (*fig. 2*) is supported on the seat raising levers and restrained at its upper corners by two blocks which slide in guides machined in the side beams. The sides of the pan are shaped to form thigh guards which both restrain the occupant's knees from contact with the aircraft structure during ejection and also prevents his legs being injured by being blown apart by the air pressure on emerging from the cockpit. The thigh straps of the safety harness are attached to the seat pan. The weight of the occupant is counterbalanced by two direct acting compression springs (*fig. 3*).

4. The seat raising mechanism (*fig. 4*) is operated by the seat raising handle; this is hinged and spring-loaded sideways against the side of the seat to reduce the overall width. Depression of the trigger control, through the bell-crank lever (4) and connecting link (6) displaces axially the sear bar (7). This causes rollers on the pair of spring-loaded plungers (9) to ride up the ramp faces (8) and withdraws the plungers from engagement with

the quadrants (14). Rotation of the countershaft by the handle then raises or lowers the seat. Release of the trigger control allows the plungers to engage the nearest hole in the quadrant and lock the mechanism in the desired position. Five positions are provided, with a total adjustment of 4 in.

5. The ejection footrests pivot in the cross-shaft in two split bearings and are maintained in contact with the floor of the aircraft when the seat is being raised by a reaction spring in a housing (*fig. 1*). Radius rods in trunnion guides connect the footrests to the seat pan, but allow the seat to move up and down without moving the footrests.

6. The parachute container (*fig. 5*) is a riveted sheet metal box hinged at its lower edge to a pair of brackets bolted to the seat beams. The hinge is formed by spring-loaded plungers which are freed by pulling the withdrawal knobs. The container supports the weight of the parachute during flight and takes sideways loads. The parachute lifts easily out of the container when the occupant leaves the seat. The upper edge of the container is secured to a pair of telescopic radius arms, the body of each of which is pivoted to the seat beam, and the sliding member to the container upper edge. This latter point forms the attachment for the shackle for the Type ZF safety harness shoulder strap. Each sliding member has four notches which may engage with the spring-loaded plunger. Three of these notches are chamfered on their forward faces, so that if the plunger is in either of these notches, the seat occupant can return the container to the next rearward position by leaning back without operating the harness release lever. The

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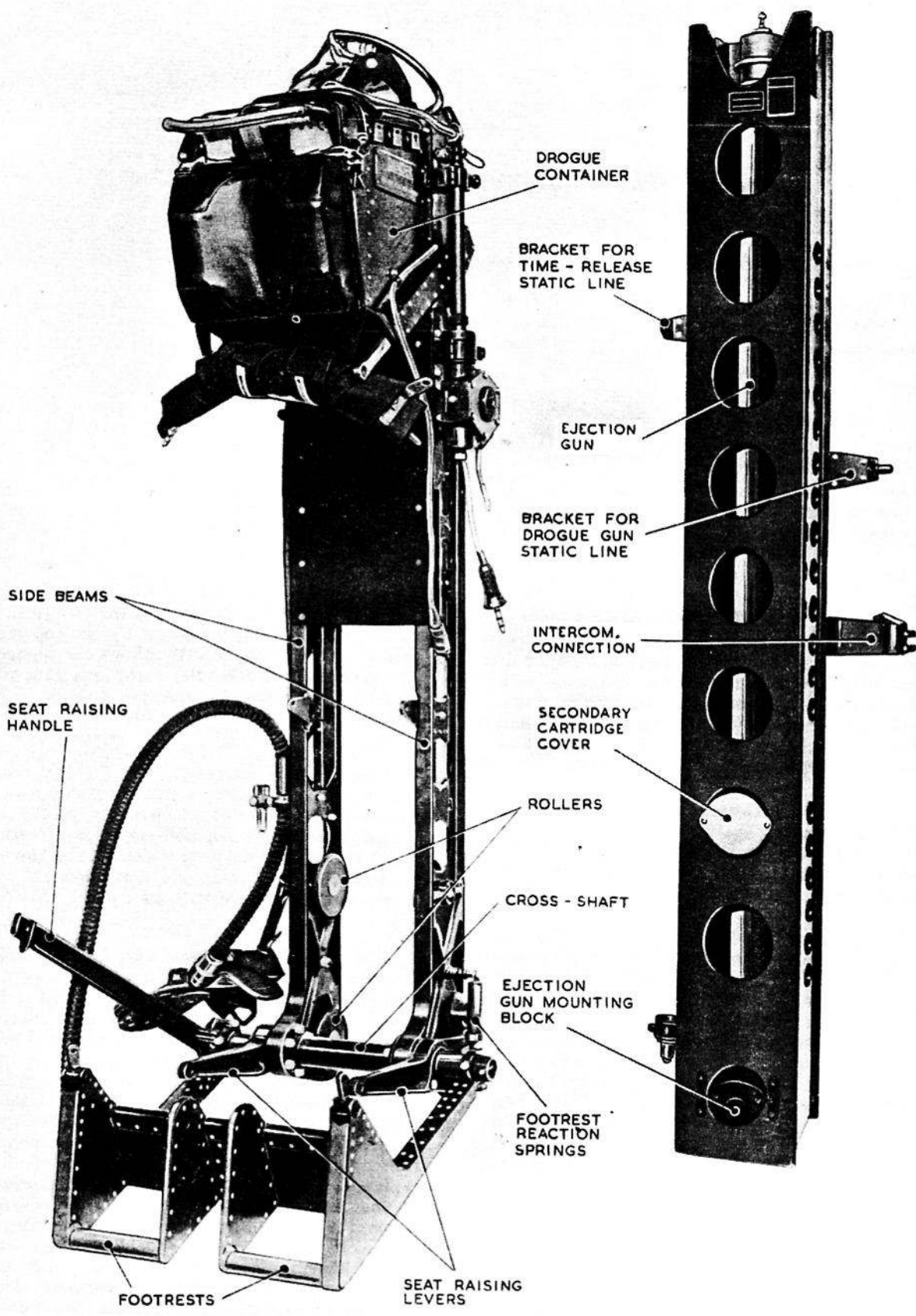


Fig. 1. Seat structure and guide rail

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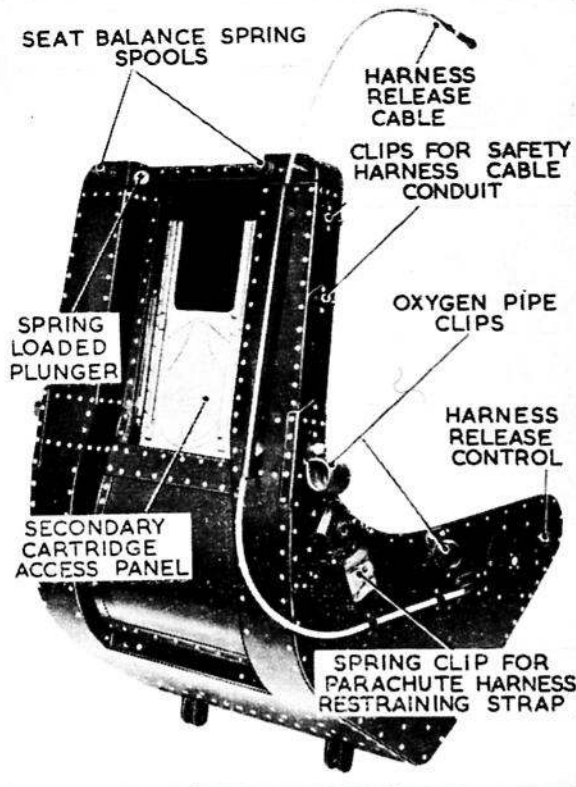


Fig. 2. Seat pan

spring-loaded plungers are controlled by the levers (8) mounted on the cross-shaft (9), the starboard lever being operated by the flexible cable from the control lever in the starboard thigh guard.

7. In the position shown in fig. 5, the mechanism is locked right back. The three other notches provide positions of restraint against forward movement, and the unchamfered one against backward movement also. With all the notches forward of the plunger the sliding member moves freely, but is limited in the forward direction by the retaining screw (10) which butts against the edge of the groove in the sliding member. The parachute container embodies clips for restraining the apron and the parachute pack.

8. The drogue container (fig. 6) is a riveted sheet metal box mounted at the top of the seat frame. A leather-covered headrest pad is secured to the front of the container by two pins which are withdrawn by the lifting lines after the scissor shackle has opened. The firing handle is attached to the front edge of the face screen. 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 user's face from the air stream and to provide support for the head. The face screen is designed to accommodate a protective helmet. The firing

cable is attached to the centre of the face screen by a sewn nylon cord loop and then passes through a conduit to the ejection gun firing mechanism. This conduit prevents the cable from being pulled inadvertently and so firing the gun.

9. The top of the drogue container is closed by four fabric flaps which normally retain the drogue. They are numbered 1 to 4 in the order starboard, port, rear, front.

Barostatic time-release unit

10. This unit (fig. 7 and 8), mounted at the top of the starboard side beam, is designed to facilitate release of the drogue connection from the seat

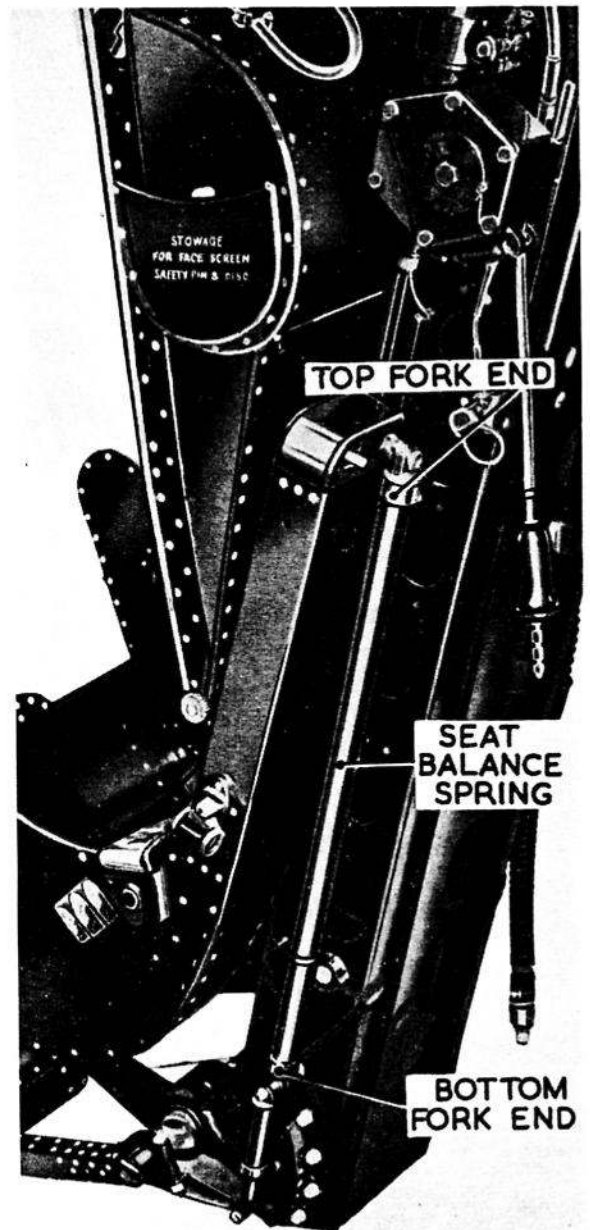
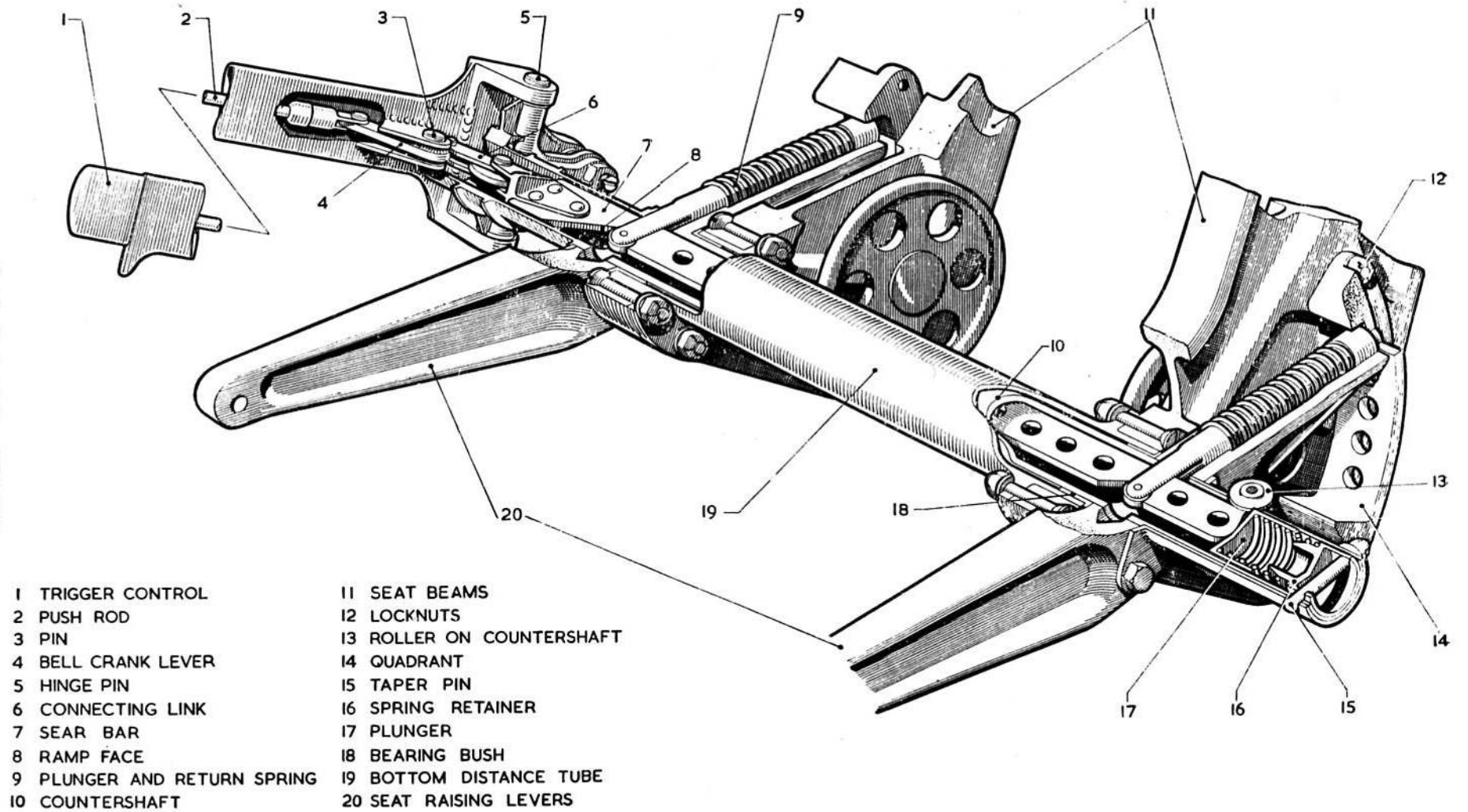


Fig. 3. Seat balance spring

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Fig. 4. Seat raising mechanism
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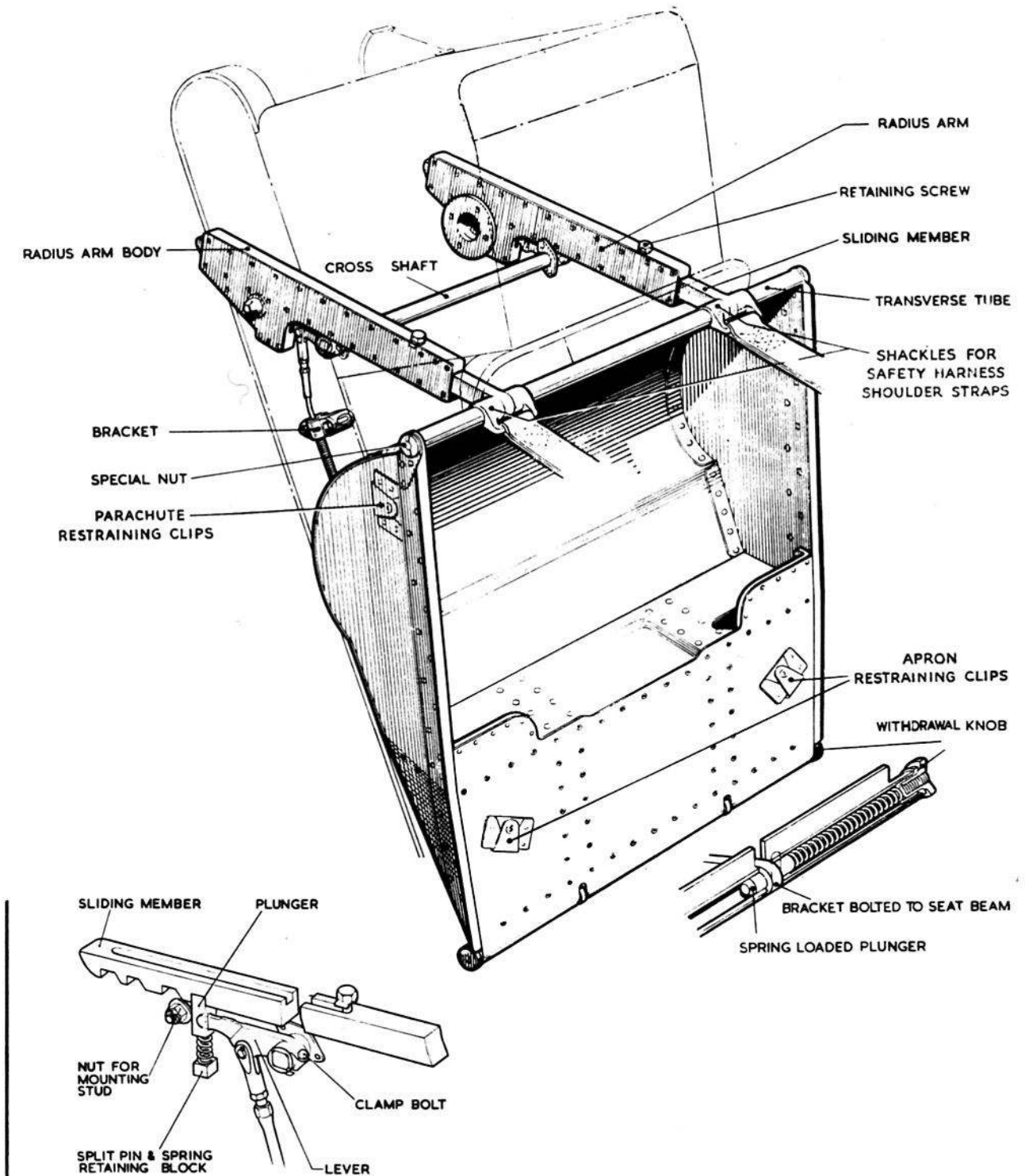


Fig. 5. Parachute container

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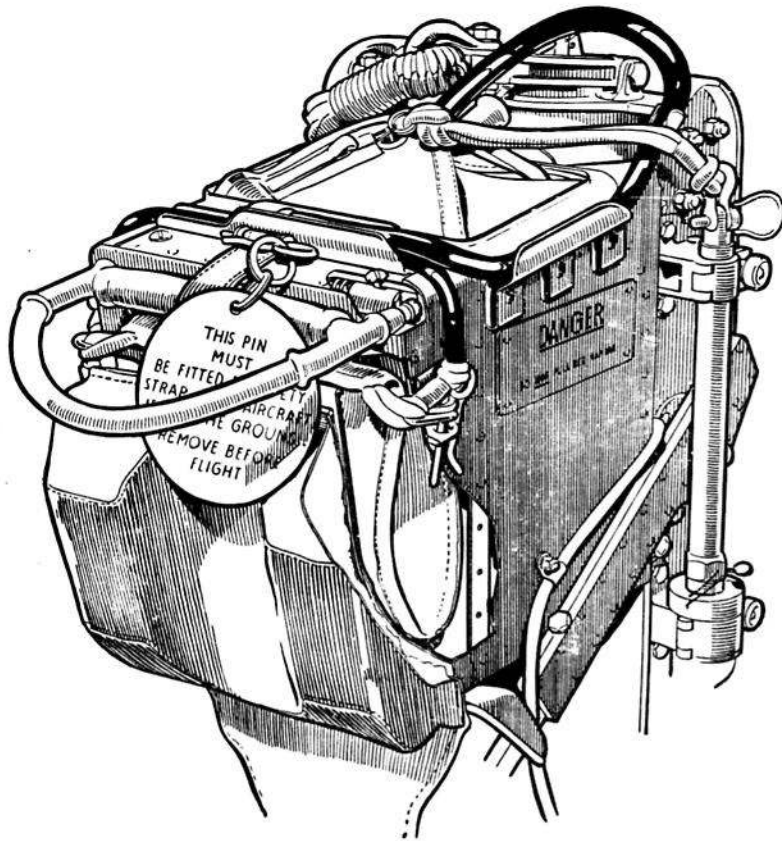


Fig. 6. Drogue container

shackle and to release the safety harness. It incorporates three spring-loaded plungers, two of which serve to actuate the previously mentioned releases. The third one, which is independent of the other two, embodies a rack which is in engagement with a train of gears. This train of gears is regulated by an escapement and star wheel which in turn is governed by a barostat. A short static line to actuate the mechanism is connected to a bracket on the guide rail.

11. The barostat control remains in engagement with the star wheel, thus preventing automatic release 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 star wheel and consequently the time-release mechanism is removed, thus allowing it to function in the normal manner and effect release of the occupant from the seat.

Operation

12. As the seat begins to leave the aircraft, the static line extracts the

sear from the release plunger which then disengages from the spring-loaded primary plunger. The primary plunger commences to rise under the spring pressure; this movement is regulated by the pinion, part of a train of gears terminating in an escapement, in mesh with the rack. After a three seconds delay, immediately the rack overruns the pinion a bell crank lever, sliding in a groove in the rack, locates itself in a slot and, as the plunger extends freely, rotates. This movement enables the secondary plunger under spring pressure to descend, and in so doing it removes restraint on the scissor shackle by virtue of the restraining plunger being free to move inwards as indicated by the arrow in fig. 8. The shackle opens and releases the drogue shackle from the seat structure.

13. The downward movement of the secondary plunger frees a pivot which is enabled to rotate under spring pressure. This in turn releases the harness release cable plunger and it is allowed to rise under the action of its spring. A cable integral with the plunger is connected to a lever on the safety harness quick-release fitting, which is then freed.

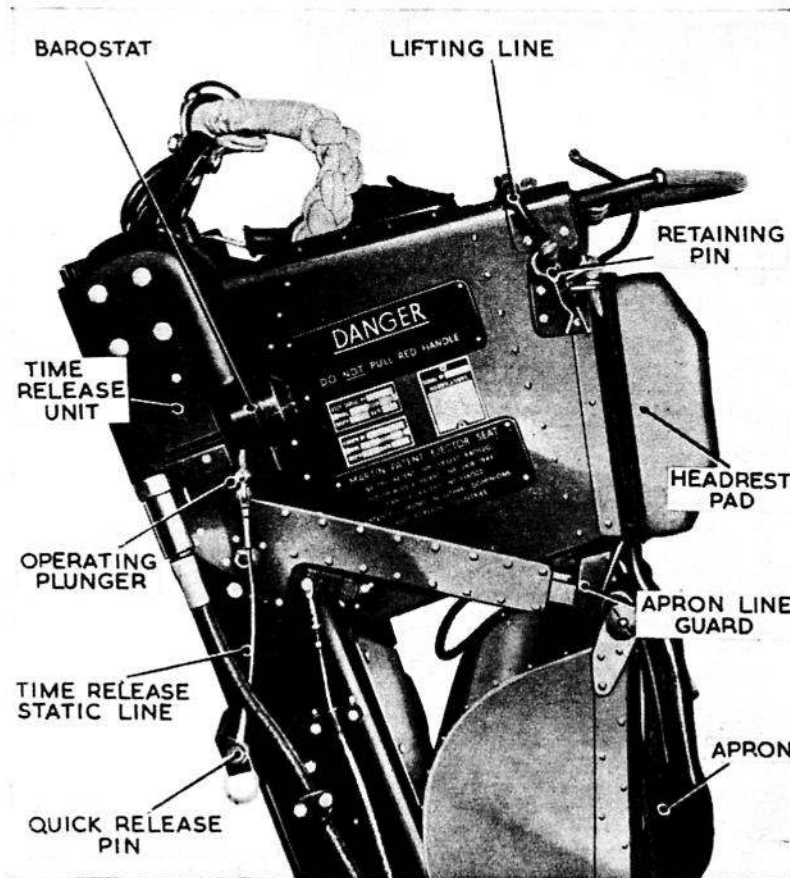


Fig. 7. Barostatic time-release unit

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GUIDE RAIL

14. The guide rail (fig. 1) consists of a single extrusion bolted to the aircraft structure and normally it should not be necessary to remove it. Built into it towards its lower end is a block which receives the thrust of the ejection gun cylinder and incorporates the bottom latch which retains the cylinder tube. The slots in the upper end of the

guide rail receive the cross-beam and restrain the forward impulse of the seat in the event of a crash landing.

15. Bolted to the rear of the guide rail are two brackets to which the static lines for the drogue gun and time-release unit are attached by quick-release pins.

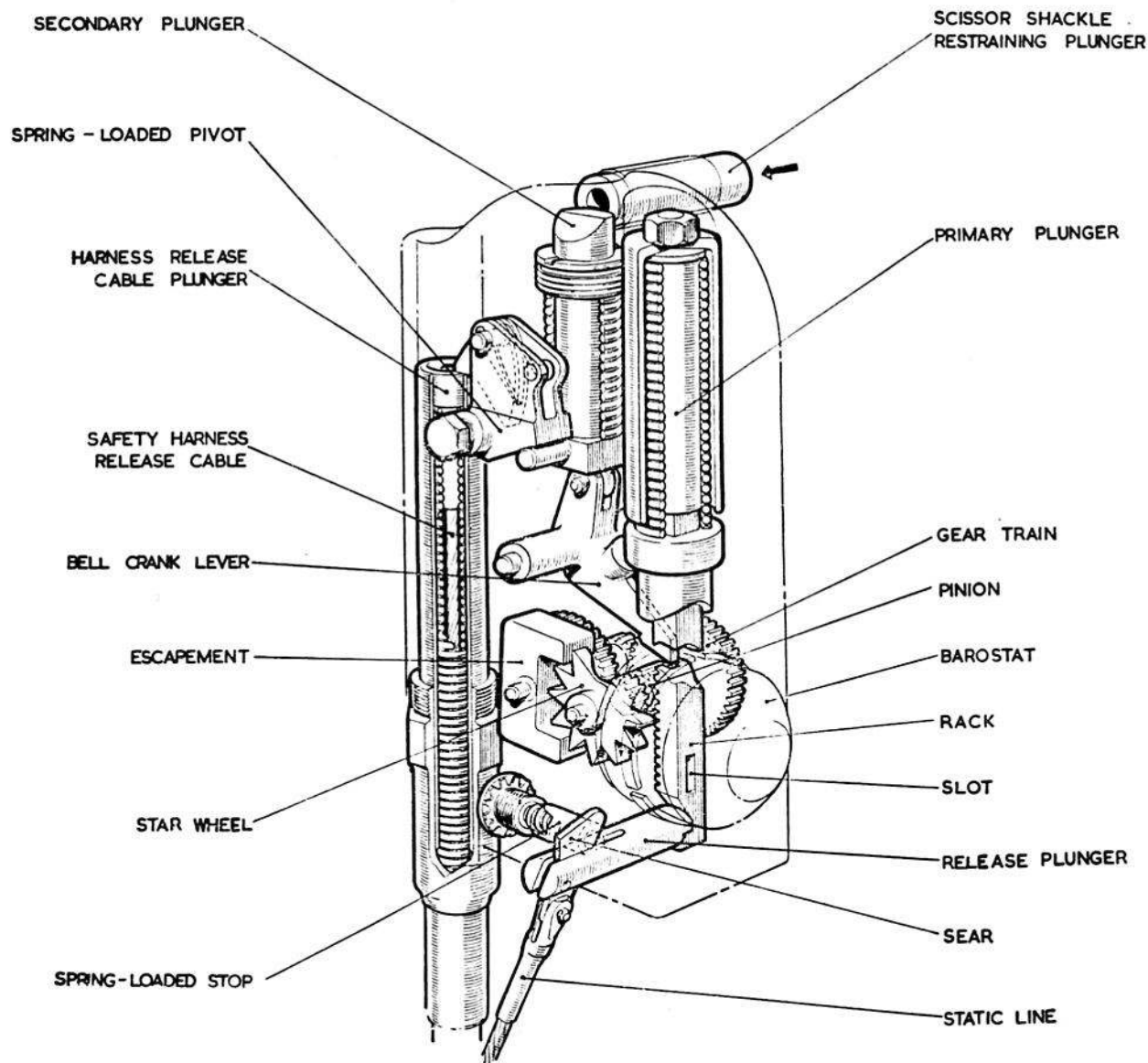



Fig. 8. Details of time-release unit

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