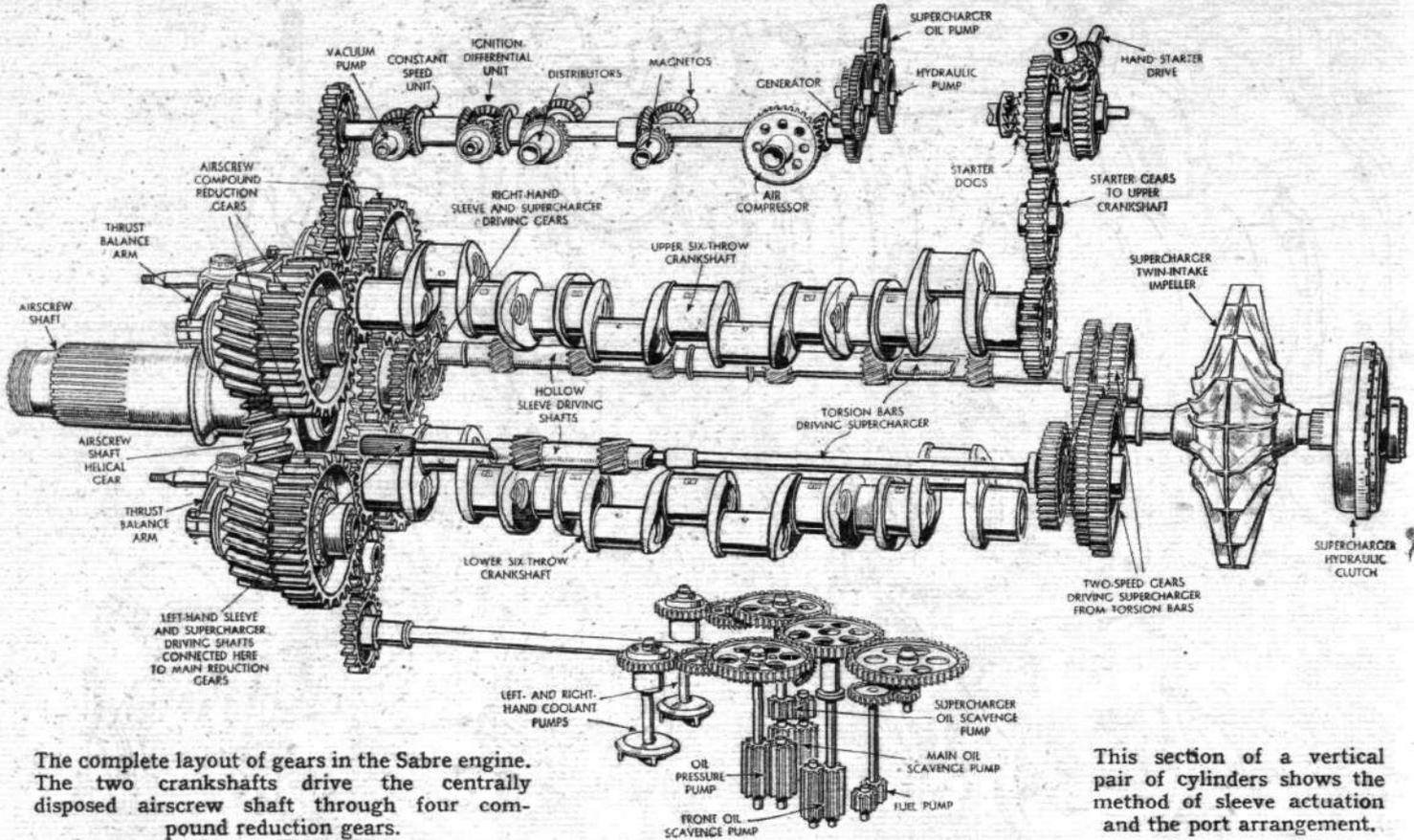


NAPIER SABRE II



The complete layout of gears in the Sabre engine. The two crankshafts drive the centrally disposed aircrew shaft through four compound reduction gears.

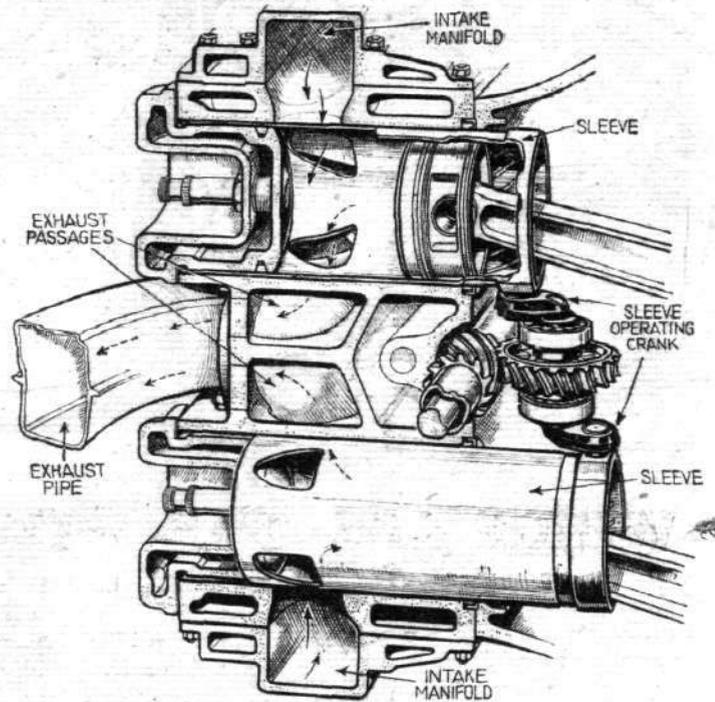
This section of a vertical pair of cylinders shows the method of sleeve actuation and the port arrangement.

light-alloy pistons are unusually shallow. This feature, in conjunction with the short stroke (less than the diameter of the piston) and the use of sleeve valves, has enabled the overall width of the engine to be kept down, and consequently the weight to be reduced. Incidentally, when the piston is at the bottom of its stroke, it is withdrawn completely from the cylinder, and is supported solely in the lower end of the valve sleeve. In shape the piston has a flat top radiused at the periphery, and the gudgeon pin bosses are webbed directly from the crown. All the piston rings are of special types; the upper pressure ring is tapered, whilst the second pressure ring is tapered and has an oil-scraper groove on the lower side. The bottom scraper ring, with a bevel on the upper face and a scraper groove on the lower face, is of the wedge-action type backed by a plain spring ring.

**Interchangeable Cylinder Blocks**

As mentioned earlier, the crankcase is divided vertically and the halves are drawn together by 20 long bolts. In addition, 12 tie bolts pass right through the crankcase and the cylinder blocks. To secure each cylinder block a further 26 studs are anchored in the crankcase. All the crankcase and cylinder block bolts and studs are fitted with a vernier washer engaging two pegs in the casting and two longitudinal grooves in the bolt or stud to avoid torsional stressing when the nuts are drawn up.

The cylinder blocks, incorporating jackets and ducts for the cooling medium, are made interchangeable for convenience of production and servicing. Right-hand and left-hand blocks are only differentiated by the fitting of the special coolant and induction manifolds. Individual cylinder heads, also jacketed for coolant, are spigotted in the cylinder bores and secured by two of the main cylinder studs and seven smaller studs directly from the block. Each cylinder bore has two exhaust ports and three inlet ports, while the steel valve sleeves, nitrided internally and machine lapped, each have four ports. One of these, designated the combined port, acts alternatively for exhaust and inlet.



Two types of sleeve are required due to the relationship of the combined port to the actuation trunnion. The problem has been rather to keep oil out of the cylinder than to admit it, and consequently a highly developed scraper device is fitted in the face of the cylinder block and operates on the outer diameter of the sleeve. This is in the nature of a contracting wedge-action scraper ring, resembling that used at the bottom of the piston. A clamping plate is fitted to retain these rings when the cylinder block is withdrawn from the crankcase. Internally the lower end of the sleeve is furnished with a series of helical grooves which facilitate the return of oil to the crankcase and tend to prevent it from being forced past the piston scraper ring. At its upper end the sleeve