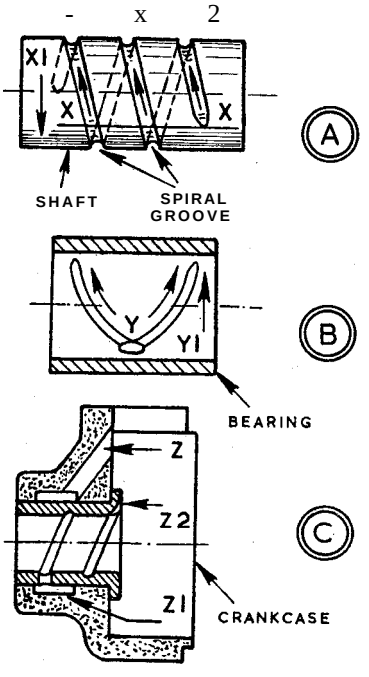
Oil grooves and slingers

By GEOMETER

TAKING advantage of the friction and mass of a fluid lubricant like oil, a suitable single groove, or simple system of grooves, can be utilised for two different purposes in engines and machines-l, to carry the oil into bearings; 2, to prevent its escape from bearings and casings where retention is essential.

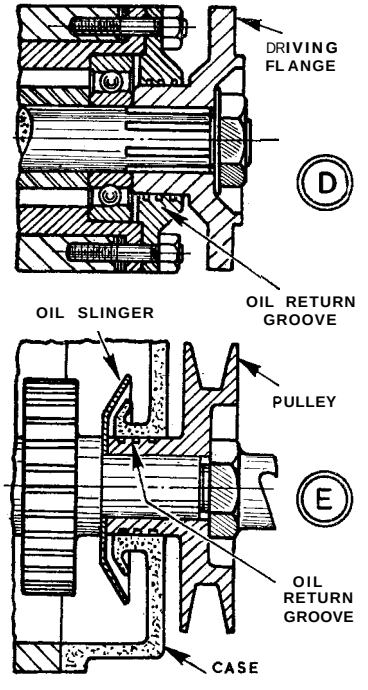
In the first application, lubrication may be much improved with consequent extension of the working life of shafts and bearings; while in the second application there is the advantage that, frequently, parts performing another function. suffice for the oil retention-no extra parts being needed solely for this purpose.

The principle is that of the Archimedean screw "pump," in which a tube is wound in the form of a spiral or thread, situated at a slight angle to the horizontal with its lower end in water., and rotated for the water to be discharged at the upper end.



In the same way oil can be displaced between a shaft and bearing, or between a boss and the bore of an enclosing casing.

How this occurs is represented diagrammatically at A. The spiral groove is a continuous one as can be cut by setting a screwcutting lathe to a coarse pitch. Taking a stationary section, such as X-X, which may be part of the supporting bearing surface, and turning the shaft in the direction Xl, there is a tendency to push oil in the groove in the direction of the arrows, and in relation to the axis of the shaft, in the direction of arrow X2, from right to left.



Thus, on the most elementary view, if it is a case of lubricating the shaft and bearing, the point of entry of oil should be to the right, so it is carried into the bearing; if the point of entry is on the left, oil will continually be drawn from the right side, which may not receive enough. On the other hand, such a thread would prevent loss of oil towards the right from a casing on the left. To maintain these effects with a shaft rotating in the reverse direction, the hand of the spiral would need to be changed from the existing right-hand to a left-hand one.

In practice, the shaft is usually plain because of the cutting action a groove would have on the bearing; and the groove is formed in the bearing. Then, the spiral must be the reverse hand; that is, where a right-hand spiral would be correct for the shaft, the bearing must have a left-hand one. Alternatively, as at B, where the feed is central, point Y, a pair of grooves leading off right and left will carry the oil across the bearing, with a direction of rotation Y1.

For the plain bearings of an enclosed model, or the timing gear bearings of a motor-cycle engine, a type of " automatic " lubrication can be arranged on the principle at C. In crankcase or timing case, oil may be splashed to run down a hole Z, passing to the end of the bearing or into a groove round the outside, Z1, whence it enters through a hole into the spiral groove of the bearing and is "screwed" back to the point Z2.

For oil retention? in a car rear axle for example, the pinion shaft driving flange may have a plain boss, and the end cover carry the oil return groove, as at ***D;*** and on an engine timing case, the pulley boss may have the oil return groove, and the bore for it be plain, as at ***E.*** Trouble with oil escaping may occur with developing wear on the ball bearing, or if the timing case is not centred on the pulley boss.

Oil slingers or throwers, which may be used with or without return threads, require a much faster speed of rotation, and are employed in housings or cases where there are channels to take the oil thrown off by centrifugal force. Correct fitting for such slingers, as at ***E,*** is with the cupped side facing the case.