Lubrication:

Friction is the resistance to relative motion between the two surfaces in contact. Any substance placed between any two rubbing surfaces, which reduces friction is called lubricant. The important functions of lubricant in bearings are:

- To reduce friction between the sliding surfaces by separating them with thin film of oil.
- To reduce wear and thereby increasing the life bearing.
- To remove the frictional heat from the bearing.
- To provide protection against the corrosion.

Types of lubricants:

Lubricators are classified as-

- Liquid
- Semi liquid
- Solid.

The liquid lubricants generally used in bearings are mineral oil, synthetic oils or animal and vegetable oils. The mineral oils are the most commonly use because of their cheapness and stability. Liquid lubricants are usually preferred where they may be retained.

Grease is a semi- liquid lubricant having higher viscosity than oils. Grease is employed where slow speed and heavy pressure exists and where oil drip from the bearings is undesirable.

Solid lubricants are useful in reducing friction where oil films cannot be maintained because of pressure or temperature. They should be softer than the materials to be lubricated. Graphite is the most common solid lubricant.

Properties of lubricants:

The following are the important properties of the good lubricant: -

Viscosity:

Viscosity is a measure of internal resistance of fluid to shear and indicates its relative resistance to flow. When the oil is used as a lubricant, its viscosity is important because the load carrying capacity is proportional to the viscosity. High viscosity oil can support heavier loads and has more internal friction. The viscosity decreases with an increase in the oil temperature. It is desirable that the change of viscosity with temperature be kept to a minimum.

Flash point:

Flash point is the minimum temperature at which oil gives off sufficient vapors to ignite momentarily on introduction of flame. A good lubricant should have the flash point above the operating temperature.

Fire point:

Fire point is the lowest temperature at which an oil gives off sufficient vapour to burn continuously for at least five seconds on the introduction of a flame.

Pour point:

Pour point is the lowest temperature at which an oil ceases to flow when cooled.

Oiliness:

Oiliness is the ability of an oil to maintain an unbroken lubricating film between the rubbing surfaces.

Cloud point:

It is the temperature at which the oil becomes cloudy in appearance when cooled.

Viscosity index:

It is used to denote the degree of variation of viscosity with temperature.

Requirement of a lubricant:

- It must have sufficient viscosity to build up the necessary pressure to keep the solid surfaces apart.
- Minimum film strength.
- High flash and fire points.
- Non- volatile.
- Free from the corrosive acids.
- It should have physical stability with regard to temperature and pressure.
- Chemical stability against oxidation.
- Resistance to emulsion.

Lubricator:

A lubricator is a device used to supply lubricant continuously and at a regulated rate. Some of the important types of lubricator are discussed below:

Drop feed oiler:

Figure shows the drop feed oiler.

It consists of a glass container with a metal base, which has a drip hole at the center. The rate of feed is adjusted by means of a screw, which slightly raises or lowers the needle, and can be seen through a glass window. Drop feed oilers are commonly used on the high-grade machinery and gives good service, if the reservoirs are not allowed to run dry. They have the objectionable feature that the ratio of oil delivery varies with the head of oil in the reservoir and with the oil temperature.

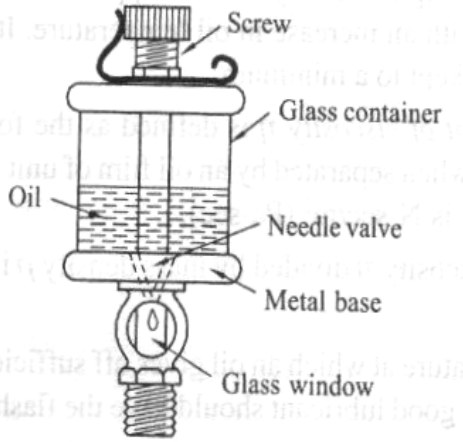

Fig. 14.1 Drop feed oiler

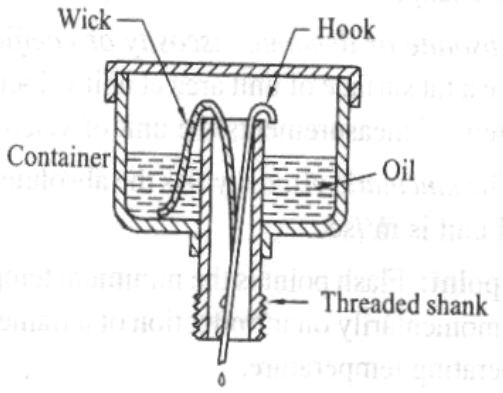

Fig. 14.2 Wick feed oiler

Wick feed oiler:

It is shown in the figure.

It works on the principle of the capillary action of some absorbent material in carrying oil to the bearing. It consists of a glass chamber with the central pipe and sink, which can be screwed in to the oil hole. The oil is drawn from the reservoir and down the bearing through a wick of wool yarn, the rate of flow being regulated by the number of strand of the yarn. For uniform rate of feed, the discharge end of the wick should be 50mm below the lowest level of

oil in the reservoir. To stop the feed it is necessary to lift the wick out of the pipe by means of a suspension hook.

Bottle oiler or needle lubricator:

It is shown in figure.

It consists of an inverted glass or plastic container with a needle passing from the oil reservoir through wooden stopper to the bearing. The needle rests on a journal and is loosely fitted to the stopper. When the journal rotates, the needle is shaken by the irregularities on journal surface and the oil passes from the oil reservoir, through the gap between the needle and the stopper to the bearing. When the journal is stationary, there is no oil feed to the bearing.

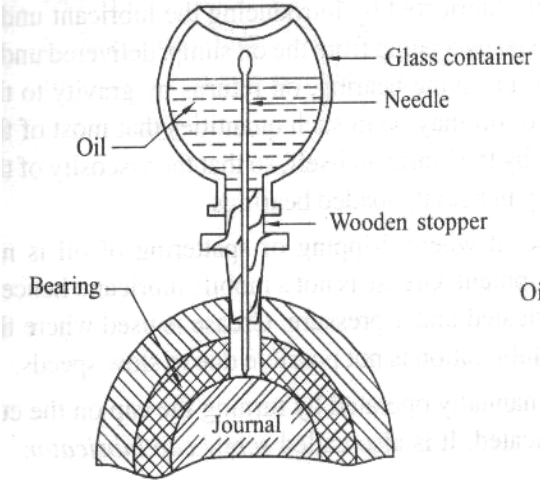

Fig. 14.3 Bottle oiler

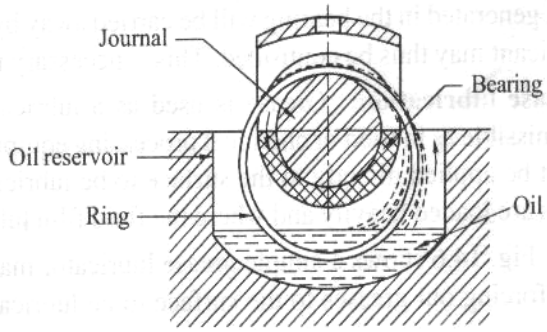

Fig. 14.4 Ring oiler

Ring oiler:

It is shown in figure.

It employs one or more rings which hang loosely over the journal and revolve with it through friction. The lower of the ring dipping in the oil carries it to the top of the journal where it is disturbed through oil grooves to the bearing surfaces. The ring oiling method is considered as one of the most reliable methods, and is extensively used for line shafting and horizontal machine bearings. The ring oiler is not very satisfactory at high speeds as the oil may be thrown off due to centrifugal force and the rings may be slip very much from the journal. The advantage of ring oiler is uniform lubrication, greater oil economy, cleanliness and less attention required.

Grease lubrication:

Grease is used as a lubricant where dripping or spattering of oil is not permissible as in food or chemical processing equipment. Grease is not mobile lubricant; hence it must be applied directly to the surface to be lubricated under pressure. Grease is used where the parts are loaded heavily and where the fluid film lubrication is not possible due to slow speeds.

Figure shows a simple grease lubricator manually operated by turning the cap on the cup and forcing out greases to the surface to be lubricated. It is also called screw cup lubricator.

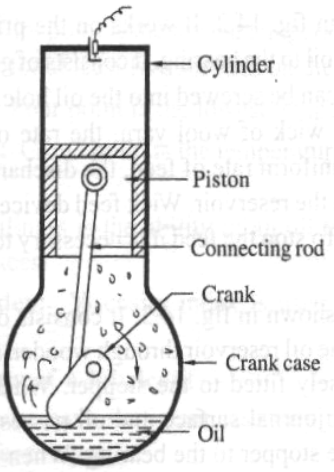

Fig. 14.5 Splash lubrication

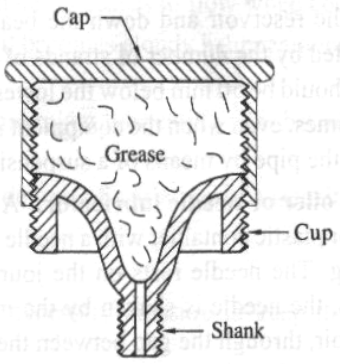

Fig. 14.6 Screw cap lubricator

Telltale lubricator:

The figure shows the telltale lubricator. It consists of a cap that carries a spring-loaded piston. The pressure on the grease due to the spring force forces out the grease to the surface to be lubricated. The movement of the piston rod end indicates whether the lubrication is in progress or not. This lubricator is best suited where a continuous supply of grease flow is to be maintained.

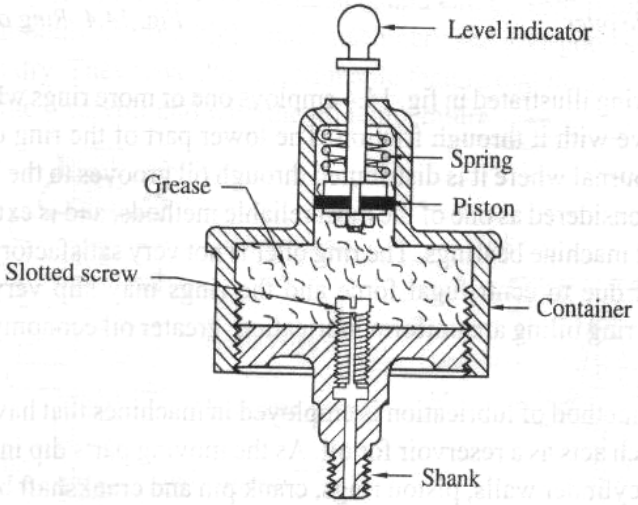

Fig. 14.7 Telltale lubricator