

MODULAR MIST LUBRICATION SYSTEM

FIELD OF THE INVENTION

The present invention relates to a lubrication system which generates an oil-air mist, conveys the mist to equipment to be lubricated and then recycles the oil returned to the system from the equipment. More particularly, the present invention relates to a lubrication system where the recycled mist from the equipment is separated into oil and air in a filter and an ejector assists in returning the mist from the equipment and passing the mist through the filter.

BACKGROUND OF THE INVENTION

For some years oil mist base lubrication or maintenance systems are indispensable elements in equipment lubrication operations in industrial plants and especially in industries where pumping equipment is widely used. Such arrangements have been in the form of central lubrication systems, which either include ecological collectors to demist the excesses of oil-mist or closed-loop circuits to allow reutilization of the oil. The ecological collectors do not completely separate the air from the oil. The closed-loop systems contain manual pumps for recycling of the condensed oil. The attention required for operation of manual pumps constitutes a problem. The initial investment of the centralized systems is very high. In previously used operations, a lubrication system of this type requires preparation of a detailed system of engineering for installation, and the installation time is great and extremely costly.

"Machinery's Handbook" of E. Oberg, F. D. Jones and H. L. Horton (21st edition Ed. Labor); "Tribological Performance Evaluation of Oil Mist Lubrication" of A. Shamim: C. F. Kettleborough (Texas A&M University, College Station, Tex. 77843-31213) and "Enhanced Reliability Through Engineered, Closed-Loop Oil Mist Systems" of Thomas K. Ward (Thailand's first Chemical & Refining Plant Maintenance Conference Oct. 26-28, 1994) disclose conventional centralized lubrication systems, lubrication systems with a mist base and lubrication systems with closed-loop and a mist base are already known.

Central lubrication systems comprise a lubricant receptacle and a console which regulates the doses of lubricant and controls some features such as pressure, temperature and viscosity, among other things. Additionally, the console conveys the lubricant toward a network of pipes which distribute it to the various local points to be lubricated in the equipment making up an industrial plant. Also, manual control is reduced with the diminution of human error and omission.

The mist base lubrication system is a central lubrication system in which the energy from a compressed gas (customarily dry compressed air taken from the air supply by instruments) is used to atomize lubricating oil. The lubricating oil is transported by the air in a low pressure distribution system to the various points to be lubricated. Due to the turbulence induced or caused by the movement of the tribo-mechanical system to the point of application, the particles of oil coalesce and produce very large drops. The drops moisten the interfacing surfaces of the tribo-mechanical system for lubrication of the equipment.

Closed-loop mist base lubrication systems are characterized by a line or line network for returning the mist. The returning of the lubricant to a tank and the recycling of the mist are known. Presently, the mist in these systems is transported by a low pressure distribution system to the various points to be lubricated.

The mist passes through the equipment. Upon exiting from the equipment, the oil condensate is recaptured in a small steel receptacle. This receptacle is affixed to the floor and contains a pump (ecological collector with pump) to transport the mist and its condensates to a second network of tubes directed toward a closed receptacle causing separation of the oil from the air by a rotating mechanical filter. With this arrangement, the oil is recycled to generate the mist, and the already clean air is released into the atmosphere.

These systems, to lubricate a great number of equipment installations, require the installation of two tubing networks, one to convey the mist and the other to return it. This situation requires detailed engineering and the installation time is costly, raising the total cost of installation of the arrangement, and is not profitable for the use of lubrication by mist in small equipment.

In consideration of the preceding, a modular lubrication system which allows recycling of the oil contained in the mist to lubricate small equipment becomes indispensable. Also, a system is needed which can be installed rapidly at any site and used where compressed air is available, and which requires neither detailed engineering nor any type of support to affix it to the flooring.

SUMMARY OF THE INVENTION

According to "Diseno en Ingenieria Mecanica" by Joseph Edward Shingley (2d edition, Ed. McGRAW HILL, p. 104), Fundamentals of Lubrication-Part 12, Industrial Applications Industrial Lubrication" by Ellis F. G. (Vol. 19, No. 2) and "Manual Universal de la Technica Mecanica (Machinery's Handbook) by E. Oberg, F. D. Jones and H. L. Horton (21st edition, ed. Labor), the objective of lubrication is to reduce friction, wear and heat wear of the machine elements which move with respect to one another. The substances which perform these functions upon introduction between the surfaces in movement relative to one another are called lubricants. Therefore, a lubricant is employed for one or more of the following objectives:

- a) to reduce friction,
- b) to avoid wear,
- c) to avoid adhesion,
- d) to contribute to the distribution of the load,
- e) to cool the moving elements, and
- f) to avoid corrosion.

It is important to note that the following types of lubricants are available:

- a) petroleum derivatives,
- b) synthetic lubricants,
- c) greases,
- d) solid pellicles,
- e) working fluids,
- f) gases (e.g. oil mist),
- g) plastics,
- h) animal fat,
- i) metal and mineral pellicles, and
- j) vegetable oils.

The technology of lubrication by mist is used in systems installations which generate, transport and apply the lubricant mist. No movable parts are involved, making the systems very reliable while requiring minimum maintenance. The center of these mist lubrication systems is the generator, which utilizes the energy of compressed air to atomize the lubricant into particles of micrometrical dimensions. In this form, the light mixture of air and lubricant is known as oil mist, which can be transported in a radius of up to 200 meters through distribution lines to lubricate the strategic points of the rotary equipment.