

The Choice of Lubricants for Machinery.

The advancement of scientific knowledge has been gradually causing the agricultural and industrial classes, who were some years ago putting in 14 to 16 hours work a day, to go in for machinery and implements which are more efficient and less expensive taking into consideration the cost of manual and animal labour of the present day.

Now we see even in small villages far from railway stations agricultural and industrial works being carried out by the use of machinery and improved implements particularly suited for the works, such as engines, pumps, rice mills, ginning machines etc. It is needless to mention that the machinery and improved implements are gradually replacing, except in certain circumstances where manual and animal labour is necessary, the less efficient and more costly manual and cattle labour and old inefficient implements.

Having installed machinery for Agricultural & Industrial purposes it is necessary for the owner to see that the plant is worked with as much efficiency as possible. That is to say one should be careful enough not to allow the depreciation on the use of the machinery to run very high and to get as large a proportion of work as possible compared with the amount of money expended in running the machinery.

The depreciation of the plant can be brought to a minimum and the efficiency to a maximum in working a plant provided that the frictional resistance to motion of the machinery be brought to a minimum. This is not all. As I have chosen to deal with the choice of lubricants I confine myself to deal so far as the relationship between a proper lubricant and the successful working of a plant is concerned.

When any machinery is run, the surface of the parts that are set in motion rub against each other resulting in resistance which is called "friction." To achieve the above objects, it is desirable, that this frictional resistance should be brought to a minimum. And this can be done by lubricating the surfaces that rub against each other with suitable lubricants.

In some villages the owner of a machinery lubricates the bearings of his machines, and sometimes even the cylinder of an oil engine, with castor oil or coconut oil or a mixture of castor and some mineral oil thinking that these oils will satisfactorily serve his purpose so well as mineral oils specially manufactured for particular use and imported from foreign countries. As a result, in a short period his machinery gets out of order and he offers it for sale, but none would buy them though the price he demands is far less than what he originally paid for it. And he never understands the cause nor does he wish to learn the cause from people who could advise him; on the other hand he forms an opinion that investing capital in machinery is a waste.

Any vegetable oil or animal fat contains a fatty acid and glycerine. This fatty acid acts on the metallic surfaces of the machine forming a metallic salt or soap and corrodes the bearing surfaces; glycerine is practically of no value as a lubricant. A vegetable oil kept in a brass or copper vessel for a few days will result in the formation of a blue soapy substance on the surface with which the oil was in contact, showing thereby the action of the acid present in the vegetable oil on the metal. I have seen a power transmitting shaft the bearings of which were lubricated with coconut oil for a period of 5 years. The shaft was corroded at the bearing area to an extent that it was too weak to be used for the purpose. Besides, during the time the shaft was in use it was absorbing more power, in overcoming the frictional resistance owing to the corroded rough bearing surfaces and the formation of a metallic salt which offers high frictional resistance, than another shaft transmitting the same pressure and power lubricated with suitable mineral oil. And further a vegetable oil does not satisfy the conditions required for a lubricant for machinery.

A good lubricant should have a good percentage of hydrocarbons, the required viscosity (i. e.,) degree of fluidity, flash point (i. e.,) the temperature at which the oil begins to flash and decomposing temperature i. e., the temperature at which the elementary particles

combined by affinity or chemical attraction separate from each other and should not contain any acid matter.

When a bearing is lubricated the lubricant should be viscous enough to remain between the rubbing surface in the form of a film so that when the machine is run the particles of oil slide one over the other keeping the metallic surfaces apart from rubbing against each other, without being squeezed out of the bearing by the pressure which the surfaces are subjected to. For high speed and low pressure such as the oil-engine piston, the yarn spindles in a spinning factory, the centrifugal cream separator or a bicycle a thin oil should be used. For high pressure and low speed such as the fly wheel shaft of an oil engine or main shaft bearing, the oil should be thick.

If a thick oil be used for low pressure and high speed the friction between the particles of the oil itself will offer sufficient resistance even to stop the machine. A heavy steam engine cylinder oil, used in the cylinder of an oil engine will stop the engine in a few minutes. The lubricants manufacturing firms, taking into consideration the good points already referred to above, manufacture lubricants of various kinds possessing various degrees of these qualities so as to suit the various pressures, speeds and temperatures. For instance in an ice machine the lubricant should be a non-freezing one. Vegetable oil freed from acid matter may be used if it satisfies the above conditions (for instance almond oil freed from acid matter is used for watches and clocks as a lubricant). In general, vegetable oil has a low flash point (open or close) and a low decomposing temperature freezes at lower temperatures than mineral oils. In mills situated in hot climates people are very careful not to use vegetable oil at all. For cotton waste soaked in a vegetable oil and exposed to the open atmosphere will decompose and even catch fire.

In the Central Farm Coimbatore engines, pumps, (centrifugal and triple acting reciprocating force pumps) cotton ginning, thrashing, cotton seed crushing, chaff cutting, refrigerator and bone disintegrator machines are at work every day. Only one kind of oil has been used both for cylinder and shaft bearings in the following manner and

have been found to be quite satisfactory for practical purposes. The fresh oil is used first for cylinders of engines and the waste oil from this is carefully filtered and used for shaft bearings. Hornsby special cylinder oil from Messrs. Massey & Co., was being used for sometime, later Valvoline oil from Messrs. Vacuum Oil Co., was used and now light engine oil from Messrs. Best & Co., is being used. The cost of these oils vary, from one another, a little and in quality no perceptible difference is noticed in the use of these oils.

In conclusion I may state that, even though a mineral oil may be more costly, vegetable oil is not at all desirable to be used as a lubricant if it is not freed from acid matter and does not satisfy the other conditions. A mineral oil possessing the required viscosity, flash point and high decomposing temperature can be obtained from oil firms and will be very satisfactory as such oil does not contain glycerine and contains hydrocarbons, which do not react with formaldehyde and sulphuric acid, which are essential for lubricating purposes, as such oils have a low sp. gr. and high viscosity.

A. K. SUBRAMANIA AIYER.

Paddy in the Musiri Taluk of the Trichy. District.

As one passes through the Kadarambam areas of the Musiri Taluq in the paddy season, one is struck with the excellent crops of paddy being grown there. The reason is that intensive cultivation is responsible for this. Paddy season extends from Ani to Margali (15th June to 15th December). Seasonal planting is considered absolutely necessary to achieve best results. The lands are generally under tank irrigation supplemented by wells. The latter are so very useful that Cumbu and Ragi are raised solely with their water as a first crop. Broadcasted crops are said to yield better than transplanted ones. The seed rate for broadcast paddy varies from 12 M. M. to 16 M. M. and that for transplanted paddy from 24 M. M. to 32 M. M. About 7 cartloads of leaves obtained from neighbouring forests are applied. A yield of about 5000 lbs. per acre is obtained. Improvements done in this