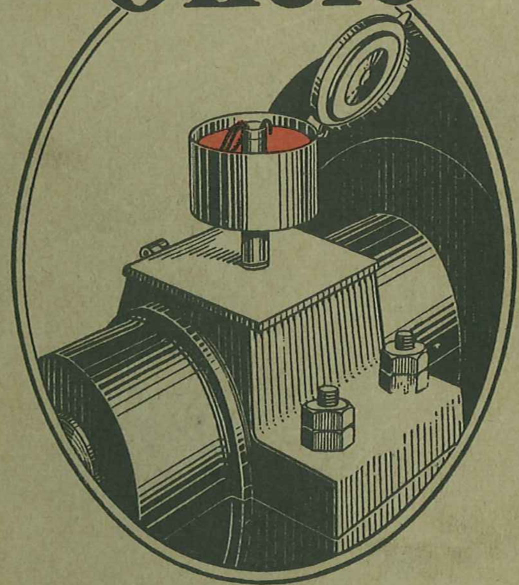
Wick Feed Oilers



VACUUM OIL COMPANY
New York U.S.A.

WICK FEED OILERS

PRINCIPLE *of* OPERATION
CONSTRUCTION
FIELD *of* SERVICE

VACUUM OIL COMPANY
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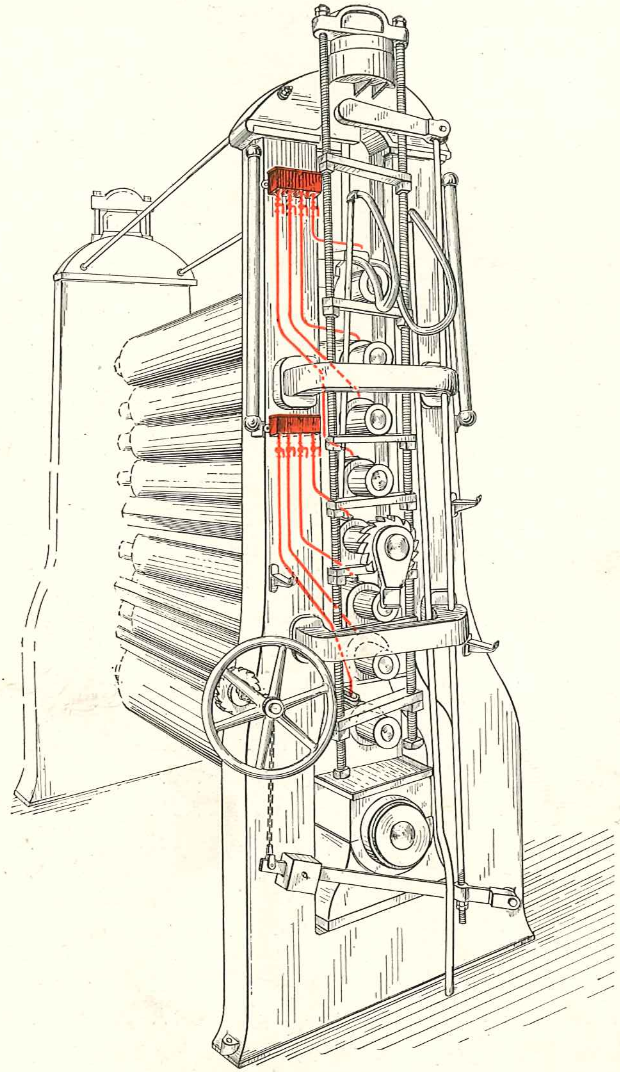

Fig. 1—Multiple wick feed oilers on calender stacks of paper mill.

WICK FEED OILERS

Their Construction
Principle of Operation
Field of Service

INTRODUCTION.

AMONG the many methods of feeding oil automatically, at present in use, probably the oldest is that by means of a wick or pad of absorbent material. Notwithstanding its antiquity, this method is still quite prevalent. While some devices of this kind are crude, and give nothing like true economy, the correct application of this principle is excellent in its results.

Since correct lubrication is the application of the right oil, to the right place, in the right way, which implies that it must be applied in the correct amount, the ideal lubricating appliance is one which will deliver the oil with certainty, and in measured amount—that is, an amount which can be closely regulated and which requires little attention from the operator.

No one lubricating appliance is the best for all conditions. The Wick Feed Oiler, Bottle Oiler, Mechanical Force Feed Lubricator and the Drop Feed Cup, each has its special fitness for certain types of equipment and under certain operating conditions.

Engines and machines of modern design are generally equipped with some automatic lubrication system or oiling device. On the older types of machines, however, many bearings are provided only with oil holes in the bearing caps and the operator is depended upon to apply oil at more or less frequent intervals—a very uncertain and laborious method.

The operator who is interested in improving the lubrication of his machinery and in saving labor, will find many useful suggestions in this booklet.

Wick feed lubrication is so satisfactory that in many cases the designer of a new machine can use the principle to advantage in preference to other methods which are sometimes considered more modern.

TYPES OF WICK FEED OILERS.

All wick feed oilers are similar in that they make use of capillarity, i.e., the absorbent power of some porous material.

The various types of wick feed oilers may be grouped as follows: absorbent pad oilers, siphon oilers and bottom-feed wick oilers.

General Principle

If a small open glass tube is dipped into oil or water, there will be an attraction between the liquid and the walls of the tube which will lift the level of the liquid within the tube above that of the surrounding liquid. The same is

true if a drop of oil is placed at the edge of a joint between metal surfaces; the oil is very quickly drawn into the joint.

Similarly, when a porous material, such as cotton or wool, is dipped in oil, the oil will rise and be held in the porous material. The wick of a kerosene lamp and the moistened sponge are common illustrations of this.

Capillary action is dependent upon a characteristic of the liquid called surface tension, also upon the nature and form of the surface with which it comes in contact. In other words, the properties of the oil and those of the wick are both influencing factors of wick performance.

Absorbent Pad and Felt Roll Oilers

The crudest application of the wick principle to lubrication is the use of an oil saturated *pad of cotton or wool waste,* placed in a recess in the top of a bearing which provides a gradual flow of oil to the journal. While this is an improvement over the hand application of oil where no provision is made for retaining it, the oil drains from the pad to the bearing whether the journal is running or not, and the rate at which it feeds rapidly decreases. The bearing is flooded just after oil has been placed on the pad, and soon afterwards becomes comparatively dry.

The felt-roll oiler is illustrated in *Fig. 2,* and consists of a cylindrical roller around which is wrapped absorbent felt. This roller is so placed that, as the journal revolves in the bearing, it will roll on the top of the journal. Oil is sup-

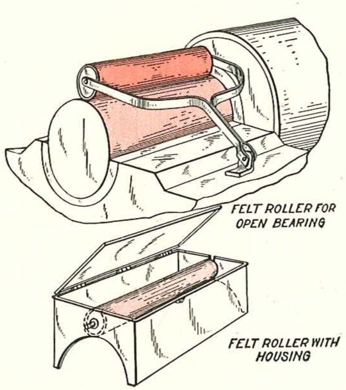

Fig. 2—Applications of felt-roll oilers.

plied to this roller by hand, or sometimes, automatically by a siphon oiler or sight feed oiler. On a large journal this serves a useful purpose in distributing the oil evenly, and it holds the oil for a much longer time than a stationary absorbent pad. Due to its continuous motion, the felt will not char or become glazed, even though in contact with a hot journal.

Where a wick feed oiler is used in conjunction with a felt-roll oiler, the oil should be fed to the journal just before the journal comes into contact with the felt roll. In this way the oil is better distributed and is better absorbed by the felt roll than if applied directly.

The felt roll is used extensively on journals of beaters in paper mills, where its simplicity and effectiveness recommend it for the rough service, in which the bearing is subject to frequent jars and shocks, as well as the washing and wiping effect of wet stock.

The Siphon Oiler

Siphon oilers are made in the form of wick feed cups, marine oilers, multiple oilers and other variations which will be described.

The principle of the siphon oiler (*Fig.* 3) involves the action of a siphon (A) in addition to the capillary principle already described. The wick (B) leads from an oil reservoir upward and over a partition (which may be the wall of a tube) and downward to a level lower than that of the oil in the reservoir. If capillarity is able to raise oil up to the highest point of this wick, then both capillarity and gravity will cause the oil to flow downward on the opposite or discharge side. If the discharge end of the wick is lower than the surface of the oil in the reservoir, its saturation will become so great as to cause the oil to drop off.

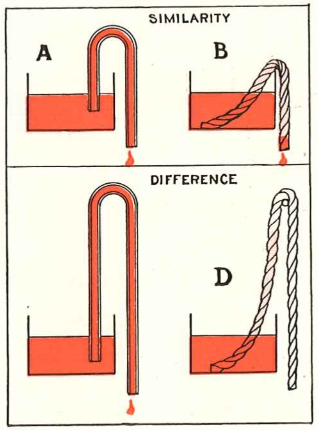

Fig. 3—Comparison of tube and wick siphons.

In a wick of good quality the absorbent power will raise the oil to a height of two or three inches, although the greater the height, the less the amount of oil raised. If the rise of the wick (D) is greater than two or three inches oil cannot be expected to pass over it.

The force which actuates the flow of oil is the difference in height of the oil in the reservoir and that of the discharge end of the wick. It has been found by experience that when the discharge end of the wick is about two inches below the oil level, the rate of flow will be very near the maximum obtainable. Decreasing the length of the wick very materially cuts down the rate of flow.

A change in the level of the oil in the reservoir will greatly affect the rate of flow. Therefore, to obtain uniform results the oilers must be designed so that the level of oil will not vary too much between fillings. This means that the siphon oiler must be wide and shallow.

The siphon wick feed oiler is not wholly automatic, in that it will continue to feed until it is empty. To avoid wasting oil, the wicks must be lifted when the machine has stopped running.

The wick feed cup, the most common type of siphon oiler, consists of an oil cup or reservoir with a central vertical tube or standpipe, in which the discharge end of the wick can be placed. The cup is supported by an extension or continuation of the standpipe below the bottom of the cup, called the shank, which is screwed into the bearing cap, or connected to the bearing by a pipe.

A wire holder for the discharge end of the wick insures the wick always being in the right position, and facilitates its removal when the machine is stopped and its correct replacement when the machine is started.

The ordinary wick feed cup is so deep that it does not feed sufficiently after it is half empty, necessitating frequent refilling.

The effect of difference in design in a wick feed cup is shown in the diagram, *Fig. 4*. With a deep cup, or a shallow cup with a short shank, the rate of feed varies widely between the upper and lower levels of the oil. With a shallow cup and the correct length of shank, the rate is more nearly uniform for all oil levels. The rate of feed should always be greater than the minimum requirement for the bearing for which the cup is used. Consequently, the smaller the variation in feed, the greater is the economy of the wick feed cup.

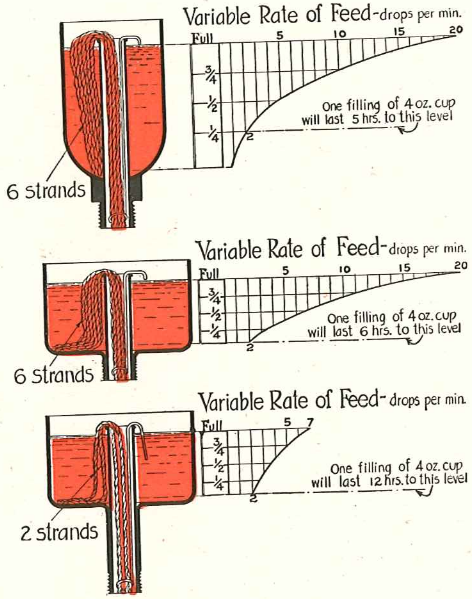

Fig. 4—Diagram showing how differences in cup design influence the rate of feed. The above rates of feed are for a very light bodied oil. For heavier oils the feeds are slower. However, the relative rates of feed for any oil with the different designs and oil levels vary as shown in the diagram.

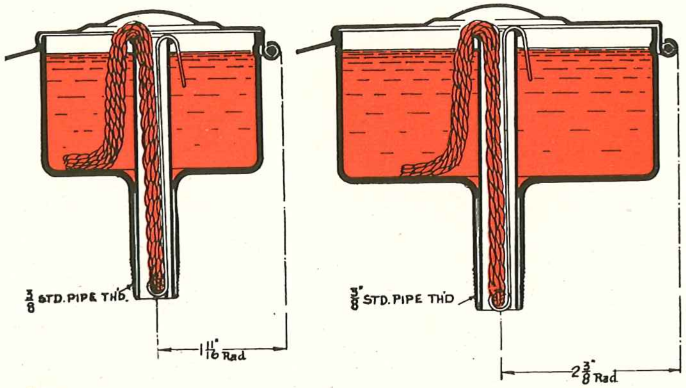

Fig. 5—Correct designs of 4 oz. and 12 oz. wick feed cups.

The Vacuum Oil Company has designed wick feed cups of 4 oz. and 12 oz. capacity, illustrated in *Fig. 5*, the use of which insures a uniform and economical feed. These cups are made in a "squatty" form, with a large standpipe to permit the use of several strands of wick without crowding. The shank is of a length which permits the discharge end of the wick being located about two inches below the oil level when the cup is partially emptied. A single filling lasts over a longer period (as noted in *Fig. 3* at A), requiring less frequent attention.

A tight fitting cover is provided for these cups, as shown in *Fig. 5*, which guards against moisture and dirt. This cover is securely hinged so that it cannot fall into the machinery and cause accidents.

The *method of installing* a wick feed oil cup on a bearing originally intended for grease lubrication is illustrated in *Fig. 6* (upper part of figure). A block of wood has been fitted into the grease cavity, and the shank of the cup has been screwed into this block.

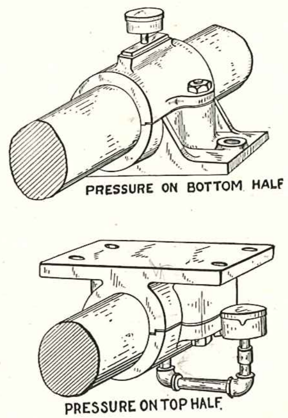

Fig. 6—Applications of wick feed oil cups.

The lower part of the same figure shows a method of installing a wick feed cup feeding oil to a bearing in which the pressure of the journal is upward. The oil is delivered by gravity to the low pressure side of the journal and carried by its motion to the high pressure area in the upper part of the bearing. If the wick feed cup is mounted on top of such a bearing, the upward pressure raises the journal and closes the oil hole, thus preventing the flow of oil and the formation of an oil film.

A shut-off cock is frequently used in installing wick feed cups, as shown in *Fig. 18*, page 24. Instead of removing the wick when the machine is stopped, the shut-off cock is closed. A small amount of oil accumulates in the standpipe, and this flushes the bearing when the machine is started.

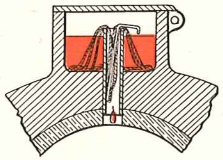

Fig. 7—Marine type of wick feed oiler.

The marine wick feed oiler (*Fig.* 7) consists of an arrangement similar to that of the wick feed cup, but is constructed as a part of the bearing cap. This type is very commonly found on marine machinery and tunnel shaft bearings, and occasionally in equipment of manufacturing plants. Sometimes instead of using a tube, as in the illustration, the wick extends from the oil reservoir over a partition in the casting, and down to a point near the revolving shaft. The principle is the same as for the wick feed oil cup.

The multiple wick feed oiler (*Fig.* 8) is also exactly the same in principle as the wick feed oil cup, consisting of a single reservoir, usually an elongated rectangle in shape, with two or more standpipes and shanks. This device is

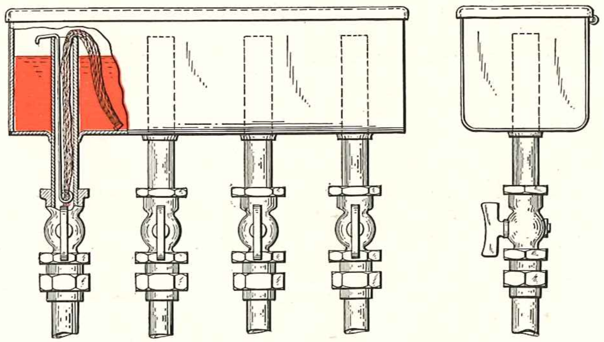

Fig. 8—Multiple wick feed oiler.

intended to serve a group of bearings. It is mounted higher than the bearings, on a post, on the wall or on the machine, and the lower end of each tube, or shank, is connected by a small pipe or flexible tube to the bearing which it serves. Each wick is provided with a wire holder, as in the case of a wick feed oil cup. If desired, a shut-off cock and coupling connection can be fitted on each of the tubes.

A type of wick feed lubricator, usually multiple-feed, in which it is possible to maintain a constant oil level, is illustrated in *Fig.* 9. This lubricator consists of a wick feed box having one or more feeds, and an inverted glass jar or bottle mounted above, the location of the bottle mouth or opening determining the level of the oil in the wick feed box. The oil level in the box remains constant as long as there is any oil in the bottle.

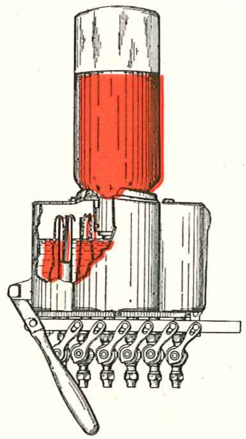

Fig. 9—A constant level wick feed oiler.

By throwing a single lever, all feeds from the wick feed box can be shut off, thus preventing waste of oil when the machine is not in operation.

The application of a multiple wick feed oiler to the bearings of a calender stack in a paper mill is illustrated in *Fig. 1.*

Another application of the wick feed oiler to a calender

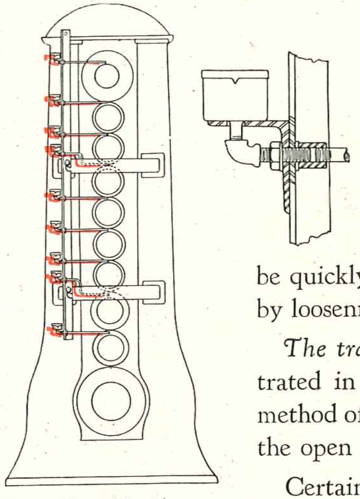

Fig. 10—Easily removable wick feed cups applied to calender stack. Method of mounting individual cups on angle iron bracket shown at right.

stack is shown in *Fig. 10.* An angle iron bracket is bolted to the calender frame. Individual wick feed cups are mounted on this bracket as illustrated. The bracket, together with the cups and piping, can be quickly removed from the calender by loosening two bolts.

The tray and pad wick oiler, illustrated in *Fig. 11,* is a very desirable method of lubricating long bearings of the open type.

Certain bearings are constructed with a rectangular recess in the upper half of the bearing housing. A shallow, elongated tray is made to fit in this recess, leaving a space on one side. This tray is generally supported by bending the projecting edges out over the walls of the recess in the bearing cap. Hooks are provided on one side of the tray from which is suspended a piece of felt which hangs against the down side of the shaft.

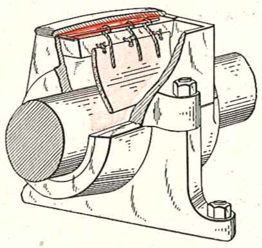

Fig. 11—Tray and pad wick oiler.

Several wicks attached to a wire in the tray hang over the side of the tray and rest on the felt pad. When the machine is not in operation, the wicks are thrown back into the tray to stop feeding.

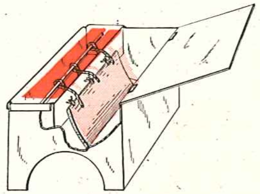

Fig. 12—Housing for tray and pad wick oiler.

This device permits regulation of the amount of feed by changing the number of wicks, and provides excellent distribution of the oil.

For bearings which are not provided with a top half or cap, a housing (*Fig. 12*) may be made of galvanized sheet iron or other sheet metal which fits over the journal, to keep out dust and dirt. In this housing, the oil tray just described is supported in the same manner as in the recess of the bearing cap.

The distributing plate (*Fig 13*) is sometimes used in the place of a felt pad or distributor, which under certain conditions may become charred and fail to give satisfactory distribution of the oil. A number of wicks arranged along the length of the tray feed oil to this plate, from which it drips to the top of the journal. The lower edge of the plate is nicked at a few

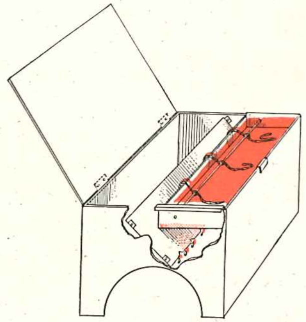

Fig. 13—Distributing plate for wick oiler.

points to prevent the oil from running along the edge of the plate and dripping from the corners.

The regulation of feed of siphon wick oilers is generally accomplished by changing the number of wicks. Another method, not so commonly used, but very effective, is that of applying pressure to the wick, thereby choking the amount of the oil flow.

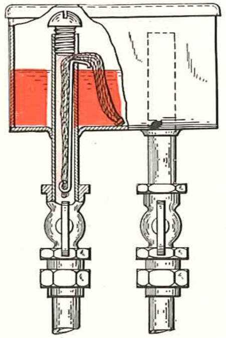

Fig. 14—Pressure regulation for multiple wick feed oiler.

A multiple wick feed oiler with pressure regulation is illustrated in *Fig. 14*. The standpipe has a slot at the top in which the wick with its wire holder is placed. A machine screw, fitted in the top of the standpipe, can be screwed down to press on the wick. When the device is made in this way, the adjustment must be disturbed in order to remove the wick, or a shut-off cock must be provided on the shank to enable the operator to shut off the flow of oil when the machine has been stopped.

The advantage of pressure regulation is that finer feed adjustment can be made in this way than by other methods. The feed can thus be reduced, if desired, to less than that of a single strand and the rate of feed is not so strongly affected by the change in the level of the oil in the reservoir.

The Bottom-Feed Wick Oiler

This method of wick lubrication is quite distinct from the

absorbent pad, generally placed above the journal, also from the siphon oiler. In this method the oil receptacle is located below the journal, and the oil is fed upward to the journal by means of a packing of wool waste or by a wick which is pressed against the lower side of the journal. In some cases wood plugs serve in place of wicks.

The principle of the bottom-feed wick is similar to that of the ordinary kerosene lamp. The bottom-feed wick oiler is automatic in action, in that it feeds to the journal no more oil than it will carry away and ceases to feed when the journal stops. Therefore, this is one of the most efficient methods of lubrication. It is very convenient, requiring no attention when starting and stopping the machine.

In applying this method of lubrication, it is necessary to remember that a wick will not lift oil to an indefinite height. If the surface of the oil is more than two or three inches below the journal, the degree of saturation of the wick at the point of contact with the journal will be reduced, and the lubrication insufficient. It is best, therefore, to keep the height less than two inches.

The bottom-feed wick oiler is particularly well suited to bearings on which the pressure is on the upper half. In the application of the bottom-feed wick oiler, the oil is fed to the bottom of the bearing where the pressure is least and is carried by the motion of the journal to the upper part, where lubrication is most required.

For bearings subjected to a light load, even though this load may be on the lower half of the bearing, the bottom-feed wick oiler can be used effectively. Sometimes for this condition, the wicking material is carried up so as to make a contact on the side of the journal, thus avoiding the area of greatest pressure.

Railway truck journals and motor axles are frequently mounted in bottom-feed, waste-packed bearings which are virtually bottom-feed wick oilers. Such bearings are illustrated in *Fig. 15,* which shows both truck and motor bearings. The oil receptacle in each case, located below the bearing, is so packed with absorbent wool waste, that it will be always in contact with the journal.

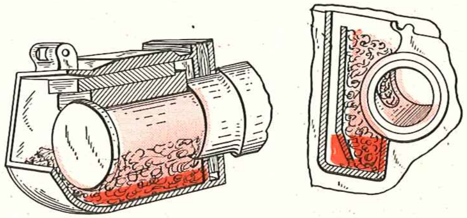

Fig. 15—Railway truck and motor bearings.

In the railway truck bearing, the pressure of the journal is upward against the bearing. The waste packing feeds oil to the bottom of the journal, which carries it up to the point of greatest pressure. In the railway motor-armature bearing, the pressure is sometimes upward and sometimes downward on the bearing, depending upon weight, gear action and direction of rotation, and for this reason the waste extends up so as to come in contact with the side of the journal, in this way avoiding the point of greatest pressure.

Other bottom-feed wick oilers are shown in *Figs. 16* and

17. The former represents the bearing of a small electric motor with a bottom-feed wick, in which a felt wick is pressed against the bottom of the journal by means of a spring, and draws oil from the screwed cup. *Fig. 17* shows the lower bearing of a band-saw mill, with bottom-feed wick oiler.

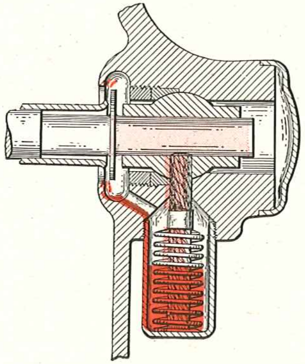

Fig. 16—Bottom-feed wick oiled bearing for small motor.

Although wool waste will hold itself against the journal by its own elasticity when properly packed in the bearing, a wick must be held in contact with the journal by means of a spring. In order to secure lubrication by means of the bottom-feed wick, it is absolutely essential that the absorbent material be in contact with the journal.

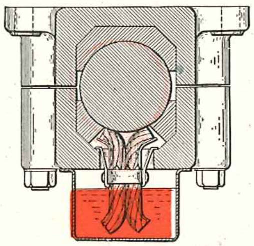

Fig. 17—Bottom-feed wick oiled bearing for pressure on upper half of bearing.

When bearings are exposed to cold weather, and permitted to stand and become cold, as is often the case with railway and street cars, it is an excellent plan to have wool waste directly in contact with the journal, because it acts as a reserve supply of oil at the point where it is needed. The bearing begins to heat, due to friction, when it starts, and the oil in the waste is immediately warmed so that it will flow. This oil provides lubrication until the heat has penetrated through the metal to the oil in the reservoir, permitting regular flow to be established.

APPLICATION OF WICK FEED OILERS.

The type of wick feed oiler must be determined with due regard to the type of bearing on which it is to be used. The applications of wick feed oilers to machinery used in the various industries are numerous. However, the field can be enlarged—with beneficial results. The following pages cover a few important applications as examples.

Influence of Type of Bearing

The length of bearing determines whether the lubricant can be applied at a single point or whether it must be distributed at several points along the bearing.

Usually a single point of feed is sufficient for bearings up to a length of 8 inches, an additional feed being added for each additional 8 inches or fraction in length. In the case of a long open bearing, the use of a distributing felt or plate is advisable.

Housed bearings and open bearings provide different methods of applying lubricants. When the bearing is housed, it is generally most convenient to use a wick feed oiler cup—more than one if the length requires, or to supply oil from

a multiple wick feed oiler. Open bearings can be lubricated by the felt roll, or tray and pad oiler.

When the pressure comes on the top half of the bearing, there are two methods of convenient application:

First—a wick feed cup may be used which is connected by a pipe to the lower half of the bearing. Oil will fill the lower part of the pipe up to the bearing, and will be fed to the lower side of the journal.

Second—a bottom-feed wick oiler, either of the waste packed type or with a wick pressed against the journal by a spring.

The second method is preferred, as the moving journal will carry away only the amount of oil required, and the feed stops when the journal ceases to revolve. It is, however, sometimes difficult to apply this method to an old bearing on account of its construction.

Bearings intended for hand lubrication are generally fitted with an oil hole which can be tapped for the application of a wick feed cup or for a pipe from a multiple wick feed oiler.

Bearings fitted with a recess in the upper half intended for the application of grease or an oil saturated pad, as has been explained, do not permit of economical operation. In such a bearing the recess can be filled with a wood or metal block into which a wick feed oiler is screwed.

Bearings subject to extreme vibration offer difficulty in as are found on conveyors, screens, hoists, etc., often require less than ½ pint of oil per month.

The ordinary operator or attendant, oiling by hand, will apply as much oil to a bearing daily as is consumed with a wick feed oiler in the course of an entire week.

Labor saving and convenience are important factors in favor of the use of wick feed oilers, particularly in places not easily accessible and on machines operating continuously or for long hours. The filling of the reservoir of a wick feed oiler once a week or once a month, as the case may require, will save much time and labor, as compared with the hourly or daily application by hand.

With this device, the correct high grade oils can be used most economically, thereby securing correct lubrication at minimum cost.

CONCLUSION.

The advantageous use of correct high grade oils, i.e., most efficient lubrication at minimum ultimate cost, is in many cases made possible only by the use of wick feed oilers of the right kind.

Many operators who, although appreciating the desirability of using high grade oils, have been deterred by the supposedly unavoidable wastage, will be quick to avail themselves of the possible benefits from the use of wick feed oilers. The adoption of these appliances will permit their

obtaining correct lubrication with an accompanying decrease in their oil bills, to say nothing of the great saving in labor costs.

The correct lubrication of mechanical equipment insures long life of machinery and minimum expense for repairs and replacement of worn parts; it saves labor, conserves power, avoids shutdowns, and is a vital factor in maintaining maximum production at least possible cost.

APPENDIX.

Treatment of Waste For Street Railway Bearings

Waste to be used for the packing of bearings should be of a high grade, long fibre wool yarn. The best specifications for waste require that no strand shall be shorter than 18 inches, nor longer than 30 inches, and that each shipment be subjected to a laboratory test, to show that it will not become soggy nor mat when the oil is added.

Waste should be thoroughly saturated with oil before using. This is a vital factor in the lubrication of railway equipment that should receive careful attention.

The waste should be *pulled apart by hand* and all short strands and foreign matter eliminated, then placed loosely in a tank containing sufficient oil to submerge it completely, using the same grade of oil that is required for the bearings at that season of the year. It is generally regarded good practice to keep this waste *soaking for a period of 48 hours*, at a temperature not lower than 70 deg. F. After this, the waste is drained for 48 hours on a coarse mesh screen, and is then ready for use as packing.

For street railway systems requiring large quantities at several depots, it is recommended that the packing material be kept in metal cans ready for use. To do this expeditiously *the following program is recommended:*

After having determined the weight of oil which will remain in a given weight of waste when soaked and drained as has been described, a tank should be constucted with steam heating coils at the bottom, having a gage glass at the side that will indicate the level of oil in the tank when it contains 50 per cent. more than the amount of oil required for the waste. Another gage glass lower down on the side of the tank, should indicate the level of the oil remaining in the tank when the correct amount of oil has been drained from the waste. A straightway cock is fitted to the bottom of the tank for draining and cleaning it.

The tank is then filled to the upper gage glass mark with the correct oil for the bearings at that season of the year, and its temperature is raised to 140 deg. F., if winter oil is used, or to 180 deg. F., if summer oil is used. The waste that has been carefully pulled apart is then placed loosely in this tank and kept completely submerged for a *period of*

one hour. This reduction in time is permissible due to the high temperature.

The waste is next lifted from the tank on a coarse mesh screen, allowed to *drain* for 20 minutes and *squeezed* in a power press, from which the oil drains to the tank. The squeezing process is stopped as soon as the oil level in the tank has reached the lower gage mark. The waste is then placed in metal cans and shipped to the various depots where it is to be used.

The oil remaining in the tank after several soakings will become thickened by foreign matter from the waste, so that at regular periods the tank should be drained by means of the cock at the bottom and thoroughly cleaned, while the oil is put through a filter and then returned to the tank.

This manner of treatment not only saves much waste, oil and labor, but also eliminates the personal element to a very great extent, and insures a uniform grade of packing. It also removes from the waste the moisture which so greatly retards saturation when soaking is done by the first method described.

Waste packing and oil may be reclaimed, the common practice being to use new waste for armature bearings and then to reclaim and resoak it, using again in axle bearings, and then to repeat the operation, for use in truck journal bearings.

When packing is removed from the boxes, it should be placed in a power press, and all of the oil and water squeezed out. The oil may then be put through a filter with heating coils, after which it is used again in the soaking tank, together with new oil. The waste is then picked over by hand to loosen the fibres and remove short strands and foreign materials before it is returned to the soaking tank.

The first cost per pound of waste should not be seriously considered when waste is purchased for packing the bearings for street railway equipment, since the use of a good quality permits reclamation, resulting in less cost per thousand car miles and much better lubrication of the bearings.

The use of a cheap waste which cannot be used repeatedly and the failure to recover oil from old packing, is a prevalent source of loss where this matter has not been seriously considered.