VALUE OF LUBRICANTS.

A system of collect and purification of the oil running of the ordinary journals into the drip pans may, in nearly all cases, be easily adopted, at once reducing the cost of lubricant and making its first cost a matter of less consequence. Suppose a grease used in the shop under consideration, and such as now costs 25 cents per pound, and assume that if is given as a sample, costing the proprietor nothing, but bringing up the coefficient of friction, as an average of 0.10. The cost of power is now the total expense, and this becomes $3.33 per hour, or $10 000 per annum, while the loss to the owners of the establishment on their bargain is $6,000 per annum.

It will next be asked, What price represents the limit which may not be exceeded, without loss, in the purchase of the oils proposed to be substituted for that first used in this instance? By a proper equation we find the second oil causes a loss of $10.78 for every gallon used, and hence cannot be used without loss, unless the user is paid that sum to take it and apply to his machinery. Comparing the first two cases named in last week's article, it is found that the second disposition of the poorer grades of oil is of such advantage that it is as well worth well worth 84 cents per gallon as is the better oil worth 50 cents, used as at first proposed. But it would be a still better investment to purchase the better oil Comparing the first and last cases, using equal amounts per gallon, the equation shows the heavier lubricant as subjecting the user to an expense amounting to over $10 for every pound used It must not, however, be inferred from this that it is always wasteful to use the greaser They are often advantageous where exceptional pressures are used, or troublesome bearings are met with, and are sometime absolutely indispensable, saving large amounts by their reduction of expense in the cooling and preservation of journals, and in the renewal of bearings. As an illustration, assume a cotton mill to use a good oil averaging 70 cents a gallon, at the rate of 0 7 per hour, with a coefficiency of friction 0 10, on machinery demanding 400 horse power, of which 120 horse power is required to overcome the friction of surfaces lubricated by the oil. Taking the value of the power at $65 per horse power per annum, and 3,000 working hours, we have one element of the equation. If it is proposed to substitute for the oils used in this mill others averaging a cost of 40 cents per gallon, giving a mean coefficient of friction of 0 12, and of which one gallon will be used per hour, and a proper equation shows a gain of nine cents per hour, or $270 per annum, in buying oil, which is to be set against a loss of 52 cents per hour, or $1,560 per annum, in increased expense on the account of operating mill, the net loss amounting to bove $1,000 per year. Had the coefficient of friction increased to a greater extent, the loss would have been correspondingly greater The differences among the lubricants sold for mill purposes in the market are sometimes enormously greater than assumed above, and a loss of $10 per horse power annually is probably not an unknown case, and this is equivalent to about double that sum per horse power expended on the friction simply.

Thus the owner of a mill could not afford to accept the second lubricant in substitution for the better oil as a gift. The substitution of an engine oil on the spindles for the best spindle oil might readily double the expenditure of power absorbed by the spinning machinery, and thus increase the cost of both lubrication and power, the former having both a higher coefficient of friction and greater price than the latter.

The conclusions to be drawn from the principles and theory which have been presented in last week's issue and in this, and from the examples of application to practice which have been introduced, are obvious and definite:—

1. To secure the highest possible efficiency of machinery and maximum of economy in the operation of establishments in which it is employed, lubricants must be carefully selected with reference to the precise conditions as to pressure and velocity of rubbing met with in the individual case. Where, as in machine shops and mills for example, there exist great differences in these respects, it will be found best to use different oils, as heavy oils on the engine-bearings, special cylinder oils in the steam cylinder, lighter oils on the shafting, and the lightest of the better class of lubricating oils on light machinery, as on spindles.

2. Differences in the price of oils or other lubricants are usually of exceedingly slight importance in comparison with differences in cost of power, and the value of the coefficient friction is therefore of vastly greater consequence than either the price of the lubricant or its endurance.

3. The best oil for specified purpose should be taken as a rule, whatever their market price; while the oils which are not well adapted to the purpose in view cannot be economically purchased at any price It will often be found that the best quality of oil is not necessarily the best oil for any one specified purpose. An oil may be intrinsically excellent, and may be a very expensive oil, but may, nevertheless, be absolutely worthless for the purpose in view. A good engine oil would, for example, be quite unfitted for use as a spindle oil, and though several times as high in price, might be the cause of such considerable waste of power on light mill machinery that the mill owner, as has already been seen, might find it to his interest to decline using it, even if it were offered to him as a gift. The heavy oils are the most costly, and in this case the better oil is, therefore, also the cheaper in the market.

4. The cost of using a lubricant which is not well adapted to the work is so great that ungents should always be tested, and their adaptability to the special case determined, by a correct system of chemical and physical tests, and by trial upon a good testing machine, if possible under the exact conditions of the intended use. The determination of the quality of any lubricant is an easy task; but the identification of the real conditions of use, as proposed, may sometimes be difficult. The difficulty arises, however, not from faults of method of test or uncertainty of results, but from defects of design or construction, or sometimes of management, of the machinery upon which it is proposed to use the oil. Where journals are kept in good order and properly proportioned, no difficulty need ever arise in the attempt to find the best possible lubricant for them. As a rule, there is no excuse for a condition of machinery which gives rise to such uncertainties As a rule, in all successfully conducted departments of business, such uncertainties do not exist; they do not arise with sufficient frequency to invalidate the above rules. Testing machines are now made in sufficient variety of form and of ample range of application, and of such satisfactory accuracy that there is no longer necessity of accepting the risks, and of meeting the enormous expense involved in the application of lubricants of unknown quality to valuable machinery.

5. Where lubricants of the precise quality desired are not found in the market, it is advisable to secure the right grade by mixing This can always be done by mixing a series of mixtures of good oils, such that, at the one side, the gravity and other qualities shall be too high, and, on the other side, too low, for the special application had in view, and thus working out—after determining by trial the law of variation—the mixture must prove suited to the purpose. The assayist has often been called upon thus to determine the best of a series of mixtures for a cylinder oil, for example, or for an engine or a spindle oil. By this method the quality of the oil has sometimes been improved for a special kind of work more than one hundred per cent.—*Mr. Robert H. Thurston in Ex.*

GROUND pine shipped from Hersey, Mich., to Detroit, for holiday decorative purposes, brings $50 a ton.

W. E. SKILLINGS, of Bethel, Me., spool manufacturer, has a contract to ship 2,000,000 feet of spool wood to Scotland.

FOR the first time in many years, when the mills shut down at Alpena, Mich., the river there will be nearly cleared of logs.

STEEL SLEEPERS.

The President of the Civil Engineers of Ireland, in his annual address to the institution remarked:—"The introduction of steel sleepers on our railways is one of those modern improvements which is gradually coming forward The success of both iron and steel sleepers has been so complete in other countries, where they have been in use in large quantities for lengthened period, that it seems almost strange that their adoption here should have been so long delayed, and that we should have continued to import vast quantities of timber from the Baltic when we had within our own shores the means of making a better and more lasting article, and further of creating a demand at home for materials at a time when foreign competition has made sad havoc with our steel manufacture. The method of fastening the rail to the sleeper has formed the subject of numerous patents, but nearly all of those which depend upon the use of bolts and nuts have been found to shake loose in time. A wrought-iron chair riveted to the sleeper seems to withstand the effects of vibration, and enables the rail to be held in position by means of the ordinary key. There are also several forms of sleepers in which a portion of the sleeper itself is turned up to receive the rail, and thus to form a kind of chair into which a wedge can be driven On some of the Indian railways where the iron sleepers are used, a wooden wedge has been driven under the rail, with the idea of giving additional elasticity"

ARTIFICIAL WEATHERING OF WOOD.

In an article on the preparation of wood for car finish, the *National Car Builder* mentions a Japanese method of treating wood for backgrounds of ornamental work which it regards as well worthy of attention. It consists, it says, in moving the softer portions of the fibre so as to leave the remaining grain in high relief—a sort of artificial weathering by which the softer portions are worn away. The method has not been very clearly described, but it appears from the information given that materials like Dutch rushes are employed to scour or grind away the surface. The boards are sometimes quarter-sawed, but more frequently they seem to have taken nearly through the heart, and at a small angle with it. This gives long sweeping curves to the grain. After the required relief has been attained the wood is filled. The final coats seem to be a hard wax finish without a polish. For panels the effect is superb As a background for metal work in relief, or for carving it would be difficult to find anything richer. To produce such work does not appear very difficult. Although the cost of such panels in Japan is very great, they need not be expensive here. The hand labor necessary for wearing down the wood may be easily replaced by machinery. The desired effect would then be obtained as well as easily. Probably the same results can be obtained by the use of the sand blast or with steel brushes. The first car builder who introduces this style of ornamentation will have something not only unique but beautiful. In many respects it would be more attractive than the stamped leather and the lincrusta now so fashionable. As patterns for stamped leather, these wood designs would be very desirable, and if we cannot have the original, it might be possible to get an imitation by the electrotype process which would answer every purpose.

REDUCTION OF THE SWEDISH EXPORT.

The management of Stockholm Wood Export Union has again begun its labors, says the *Svensk Travaru Tidning*, to endeavor to bring about the absolutely necessary agreement among exporters for a diminished output for next year. So far the union has not definitely decided on the means for the reduction, but as the work is already begun, all might well be settled before the meeting in January.

As it is well known what great trouble the managers had to bring about the last convention, and how nearly it was upset by the attitude of a few members, we hope that exporters, seeing the use of the reduction this year, will meet the management, and as much as possible lighten its work. The advantages obtained by this reduction are for every right-minded individual evident enough, as the prices obtained would hardly have been got had not foreign buyers known that a seriously-meant agreement had been entered into, and that stocks would be reduced. If one compares wood prices with those of other goods, it will be found that although the wood trade cannot boast of a really good year, yet it has been relatively a fairly good one. From all consuming countries the news has been continually reaching us that building schemes are neglected, and that the disposal of wood goods was extremely limited; further that houses which formerly speculated are now compelled to buy only just what they want. But in spite of all this prices have been tolerably good, and those who carefully and justly think over things must certainly be bound to admit that it was the confidence this last convention of wood exporters inspired abroad that has been the cause.

With such conditions before our eyes we hope that exporters as numerously as possible will support the proposition the management shortly intend to bring forward.

From several quarters in Finland we have heard that exporters there have partly decided on coming to an arrangement about reducing the export next year, and partly intend to support the Swedish exporters' convention. Should, therefore, the Swedish Export Union be supported by the Finns, we believe the management would spare no efforts to attain such an object. Certainly the Finnish export up to the 31st of August last shows a reduction of 31,000 standards, as compared with the same time last year, but compared with 1883 the reduction is only 1,173 standards, and one cannot yet judge fairly, as shipments as not yet over, and the figures for September and October are wanting. We, therefore, take the liberty to exhort our Finnish friends to carefully consider the necessity of reduction, and if possible to meet the Stockholm Export Union one or other way.

THE ECONOMY OF FUEL.

K. K. Clark in his work upon the economy of fuel says, "that only two methods present themselves, by which the supply of air and the wants of the furnace can be made to correspond—either both must be made constant and regular or the fluctuations of one must be made to coincide with those of the other," and he proposes to achieve the desideratum sought by an increased supply of air at the coaling by throwing open a sliding valve in the face of the door which immediately commences closing slowly and automatically, and affords a greatly diminished supply of air to the furnace in harmony with the greatly diminished requirements of the fuel. The area valve, and the period of time throughout which the act of closing is to be prolonged being adjusted according to the nature of the coal and the average quantity supplied at at one time. The outer furnace should be double and the air should pass into the furnace through a series of perforations in the inner plate. By this arrangement three important points are secured. First, the heating of the air; second, its subdivision into minute jets; and third, the keeping of the outer surface comparatively cool and thereby both economizing heat and preventing its radiation outwardly to the attendants.

THE largest tree that has ever been manufactured into lumber at the Champion Mills was sawed up recently. The tree made six logs, each log being 16 feet. The first log scaled 4,786 feet. The tree was sugar pine, and made a fine quality of lumber. The total number of feet in the tree was 22,632.—*Marysville, Cal., Appeal.*

BUT very little hardwood lumber has been manufactured by the Saginaw river mills this season, the condition of the market not offering sufficient encouragement to operate extensively. In 1882 the hardwood cut of the Saginaw river mills was *24 640,900 feet; in 1883, 32 741,870* feet, and in 1884, 14 061,829 feet. At the close of last year there was on hand 12,051,500 feet of hardwood stock.—*Courier.*