

ant what they wish to learn from the costs. Start with the very simplest system of collecting costs; it can always be elaborated upon, but the elaborate system if installed at the start will in all probability break down of its own weight and cause discouragement and fault finding.

The great benefit of cost accounting to the executive is derived from the knowledge of how to make use of the figures when once they are collected, and to learn the lesson which they teach. Of course it takes some time to collect the necessary data in a laboratory, to be able to say with certainty that this determination or that requires so many hours, but if over a period of a year we have let us say, one thousand coal analyses and these analyses have been made by three or four men, your figures at the end of the year will give you a pretty good working average for the length of time necessary to make one analysis, and knowing this, one can very easily estimate the average cost of such work and can set the price accordingly. Having arrived at the average time for such analyses, if there comes any wide variation in the cost it immediately attracts attention and the cause for such deviation is at once looked into and corrected.

Leaving the executive and the importance of cost accounting to him for a moment, let us look at the individual chemist who is working at the bench to see of what benefit a cost system is to him.

That cost accounting makes for efficiency there can be no doubt. The individual takes a pride in the quick accomplishment of his work, or if he does not take a pride in it, he knows that his short-comings will be called to the attention of the head of his department.

I have been cautioned not to go into the details of cost accounting in this paper and therefore will not take up the method of collecting the necessary data and applying it to a particular job. Suffice it to say that each chemist in a laboratory works regularly a certain number of hours, and our unit then is the salary cost per hour of each man plus the direct expenses, plus a figure which represents his proportion of the indirect expenses for that hour. Each man turns in a time slip every day showing the number of hours he spent on a case and from this slip the cost figures are made up.

One might imagine from this that the individual chemist has no further interest in the cost system, and that once he has made out his time slips, provided they are only average ones, he can get by and hears nothing more from it. If it took a certain man a short time to make an analysis he gets no praise; if it took him a longer time he is blamed. If cost accounting or a cost system only goes as far as this, it has failed miserably in one of its chief functions. The time spent by each man every day is of course recorded and the time and cost for each case is made out, giving the heads of the laboratories the costs they require, but here comes the application of cost accounting to the individual. As it is necessary to record his time against the case on which he is working, a record of the entire time of the individual is kept, irrespective of what case he may be working on. At the end of the accounting period this individual record shows whether a man has done efficient work or not, and in each case of good work, that man is not only rewarded by praise from the head of his department, but also, in many instances, by a cash bonus, both of which tend to show the individual that his work is appreciated.

I may be pardoned if I go into the details of the cost system for just a moment to bring out this fundamental application of cost accounting to the man at the bench more clearly, and give an example of what I mean. Suppose a man is getting a salary of \$1 an hour, or \$8 a day, and the proportion of the overhead of that department is another dollar an hour for each man working in it. It would therefore cost the company \$2 an hour for every hour of that man's time. Let us also suppose

that a certain analysis takes on an average four hours (the length of time having been ascertained from figures compiled over a year or more, and hundreds of similar analyses). We know, therefore, that it will cost \$8 to make such an analysis and have determined upon a profit of 25 per cent of the cost as our selling price. This will make the charge to the client for this analysis \$10. Now each man's individual record is kept as a profit and loss in dollars and cents on his sheet for each and every case he works on, and his value to the company is shown by the totals of these profit and loss columns at the close of each period. Therefore, if a man completes the analysis mentioned above in the average time of four hours, his individual record will show a profit of \$2 on that case. Should he, however, take five hours to do the work which an average man can do in four, his record shows no profit. If, on the other hand, he can complete the analysis in three hours, his profit will be \$4. If good work such as this last instance continues, and this man at the bench is earning more for the company by his skill and efficiency than the average, he certainly is entitled to a raise in salary or a cash bonus, besides recognition from his head of the department. In this way you can plainly see the details of cost accounting immediately become of vital interest to the man at the bench and, as I said before, not only lead to pride in his work but to increased efficiency.

To return to the executive,—be sure to draw a distinction between mere details and the information you are trying to acquire. The figures, the totals, and the costs themselves are only incidentals; it is what these figures and costs show that is important. That is, it is the summarized costs which point the trend of the business and it is necessary to have these in order that the information may be available. One can dig into them as deeply as one wishes if one wants to get at the details. A properly organized cost accounting system is a well of information from which can be drawn the conclusions necessary for controlling the entire policies of the business. An executive without a cost system is like a ship without a rudder. He may strike the right course, but the chances are very much against him, and if his competitor has a system of costs he can steer by compass and can forecast with certainty where he will arrive.

If, in this brief paper, I have succeeded in arousing your interest sufficiently to make each one ask himself whether he could improve his business by installing a system of cost accounting, why I have accomplished all, for there is only one way to find out and that is by installing such a system, and I say without reservation that once the proper system is installed, the next question you will ask yourself will be, "How did I get along all this time without it?"

WOOD ALCOHOL—COÖPERATIVE CAUTION

By Charles Baskerville¹

COLLEGE OF THE CITY OF NEW YORK, NEW YORK CITY

Received November 7, 1919

Unscrupulous persons have been selling mixtures containing wood alcohol, as such, or ethyl alcohol denatured with wood alcohol, as beverages. Coöperation of the chemical profession is sought to minimize this infraction of a law which seeks to safeguard people and yet provide industry with a most useful solvent and vehicle.

During the penumbra of prohibition the word *alcohol* has exercised a weird and unfortunate influence often times through failure to appreciate the significance of such qualifying words as "wood," "methyl," and "denatured." Numerous cases of blindness and even death have resulted through ignorance or the infamy referred to. The Commissioner of Internal Revenue has, consequently, issued the following notice:

¹ Chairman Committee on Occupational Diseases, American Chemical Society.

To Collectors of Internal Revenue and Revenue Agents in Charge:

T. D. 2914, issued to-day and showing additional matter to be affixed to containers of completely denatured alcohol, is called to your especial attention.

Reports recently received in the Bureau establish that completely denatured alcohol is being used extensively for bathing and rubbing purposes. This is contrary to the law and regulations, and such uses cannot be tolerated, as the completely denatured alcohol is highly injurious to the skin and animal tissue.

It is also established that completely denatured alcohol is being sold by irresponsible dealers under circumstances as to assure them that it is being used for beverage purposes. Where it is so used for any length of time blindness inevitably ensues, and the continued use can only result in death.

Collectors should use every means at their disposal to make known to the public the dangers of either external or internal uses of completely denatured alcohol. Wherever collectors or revenue agents in charge hear of a misuse of completely denatured alcohol, a most thorough and careful examination should be made immediately and all the facts fully reported to the Commissioner for the infliction upon the responsible parties of the ultimate penalties provided by Law.

To Internal Revenue Officers and Others Concerned:

In view of the grave and extended abuses of the use of completely denatured alcohol reported, it is deemed necessary to print upon the labels affixed to wholesale and retail packages

a further and more specific warning as to its use than is shown on the present required label.

In addition to the present matter on the labels there will be required on all new labels hereafter the printing, in large letters in red ink, under the skull and bones symbol, the word *poison*, and at the bottom of the label there will be printed the following statement:

Completely denatured alcohol is a violent poison. It cannot be applied externally to human or animal tissue without serious injurious results. It cannot be taken internally without inducing blindness and general physical decay, ultimately resulting in death.

Until the present stocks of labels are exhausted, this additional matter may be affixed to the containers on a separate label pasted above the present required label.

We chemists know that we daily handle poisons of various kinds, many far more dangerous than *wood alcohol*, and there are comparatively few evil results from their handling and use. People do not drink them. The medical profession administers daily to patients many substances that are poisonous except in the minute doses given. But in the case of *alcohol*, the "kicker" in drinks of quondam familiar kinds, means just that one desired fluid, hence attendant danger. We should do all in our power to protect those who use, and some likely to abuse, this important chemical, and thus incidentally avoid lurid appeals with consequent hampering legislation.

FOREIGN INDUSTRIAL NEWS

By A. McMILLAN, 24 Westend Park St., Glasgow, Scotland

A NEW MOTOR FUEL

According to a report in the *Times*, London, tests have been carried out on a new motor fuel, the invention of a South American Andrade. From the tests it was found that a car travelled over 30 miles on one gallon, and that, if the inventor's statements are true, a gallon can be manufactured for about ten cents. Experiments have been carried out in the presence of an experienced motor expert. The inventor claims that by mixing certain chemicals with water a liquid is produced capable of producing motor power. The chemicals may be introduced in the form of powder and minor experiments carried out are reported to be very encouraging.

NON-INFLAMMABLE TIMBER

A sample piece of yellow deal is sent by the Timber Fireproofing Company, of Fulham, treated by their oxylene fireproofing process, the use of which it is suggested, would avoid the risk of fires in houses built of wood. The process consists of submitting the wood in a closed cylinder to a steaming and vacuum treatment which removes the air and moisture in the pores of the wood and vaporizes the sap water. The wood is then impregnated under hydraulic pressure with a solution of fire-resisting chemicals which replace the elements driven out by the preliminary treatment. Finally the water of the solution is dried off and the chemicals in minute crystal form remain embedded in the fibers. The effect of this treatment is explained: that on the application of heat the crystals expand and form a glossy coating which excludes the oxygen of the air and prevents its combination with the wood, thus rendering flame an impossibility. The higher the temperature, the more the crystals expand, and though in time the chemical action of each crystal becomes exhausted and the wood becomes charred, fresh crystals come into play, and though the wood may eventually be charred completely through, no flame will be generated. Wood treated in this way does not differ in appearance from wood that has not been treated, and it is claimed that it does not corrode nails or screws, does not spoil paint or polish, does not warp, does not deteriorate, and is not affected by atmospheric conditions.

LINSEED OIL SUBSTITUTE

According to a German patent, the derivatives and substitution products of indene, in so far as they contain the double bond of the cyclopentane ring, *e. g.*, the oil products obtained by alkylating or aralkylating indene or indeniferous tar fractions in the methylene group are adapted to serve as substitutes for linseed oil on account of their miscibility with oil pigments and their property of drying in the air, especially in the presence of driers, to form glossy weatherproof lacquers which adhere firmly to the substratum and retain the pigments. For example, monobenzylindene (m. p. 33°-34°) can be transformed into varnish by the addition of 3 per cent lead-manganese resinate. A mixture of mono- and di-benzylidene with 3 per cent cobalt resinate or one of the xylylized indenenes of indene oxalate is also suitable.

NEW WIRE ROD MILL

The new wire rod mill at Templeborough, near Sheffield, which has been put up by a combination of three firms, is now working. It is the only Morgan continuous rolling mill in England, and has an output capacity of 1,500 tons a week. On double strand working it produces two 300 lb. coils of wire rod every minute. Its fly wheel, 20 ft. in diameter, weighs 50 tons, and the leather belt, believed to be the largest ever made in this country, is 60 in. wide and $\frac{5}{8}$ in. thick.

DISTILLATION OF OIL SHALE IN GERMANY

Prior to the war, says a German contemporary, shale was worked on the Rhine provinces and near Reutlingen, but only one company was occupied in producing paraffin and mineral oils. From the bituminous shale which occurs near Messel (containing 40 to 45 per cent water, 6 to 10 per cent tar, 40 to 50 per cent residues), the following yields per ton of shale are obtained: 135 liters crude oil, together with 295 liters of ammonia water and 59 cubic meters of natural gas which is burned as fuel in gas engines or under the vertical retorts. During the war the oil shale deposits in South and North Germany have been investigated in regard to their yield but so far the results have not been published.