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NON-FINANCIAL INCENTIVES

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The author contends that creative work by the workmen in the industries is not only possible, but that with it there can be introduced a personal interest in the work alike beneficial to the employee and employer.

Accounts are given of instances where this has been accomplished, through supplying foremen and workmen with information upon costs, methods of operation, possibilities in the direction of economy and efficiency, etc. Progress records are also furnished so that the employee will know from day to day how he is improving in the mastery of the process upon which he is engaged.

Freedom to express one's individuality in constructive work, properly restrained by law, is considered by the author to be essential.

THE basis of all "non-financial incentives" is interest in work. Interest in work implies a desire to produce actuated by internal motives rather than external discipline.

2 Production means creation and the industrial creative function in man is a mental process and lies in his intelligent adaptation of means to ends. It is useless, therefore, to look for real creative work unless the workman has a chance to think and to plan; any other working environment either fails to attract or actually repels the workman, and as a consequence offers no incentive to increased effort.

3 Work which does not call for thoughtful reflection, and which uses only muscular effort, tends to draw man down to the level of the brute and makes for industrial irresponsibility and consequent social disorganization. The unthinking man cannot be a responsible man.

4 It is the self-conscious faculty of man which distinguishes him from the animal and makes him above all a creative center through which the universal life giving power can deal with a particular situation in time and space.

5 To use a homely illustration with which every one is familiar

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— the traffic at each crowded street crossing cannot be regulated from the City Hall; it requires an individual (the traffic policeman) in the congested spot to deal with each particular situation as it arises, and upon his powers of observation and selection depends the orderly flow of traffic.

6 It is only through the individual life that the universal life can act and therefore the universal is compelled to evolve many individual lives if organization and order are to replace the unorganized state represented by the purely generic operation of natural law.

7 The problem of social organization is, then, how to organize society upon the basis of respect for the individual. This is also the industrial problem as well, for industry in the broadest sense is society in its highest form of activity because it is essentially constructive and therefore creative activity.

8 It was an inevitable corollary to the universal plan of creation that the individual life came into being not to create material substance, as that had to be before individual life could gain consciousness. The function of the individual life, however, is to create by a thought process conditions especially selected to produce results which nature unaided would fail to produce.

9 This is what the horticulturist does. His power lies in his knowledge of natural law and his creations are made possible because he conforms to the law. The uncultivated orchard reverts to its original wild state when no longer attended by man, but increases in productiveness by continued thoughtful application of man's power of selection and adaptation.

10 It is by a similar process of conscious selection that such devices as the steamboat, steam engine, electric generator, and the telephone came into existence. They did not come into being and never would have been created by the generic operation of nature's laws.

11 To illustrate further: the desire of the savage to cross a body of water too wide for him to swim caused him to observe the floating of things which floated naturally. As a result of this observation he built a raft; and finally, by further observation, he discovered the principle that any thing which, bulk for bulk, was lighter than the water it displaced would float, and although he perhaps unconsciously applied this principle, it is true that from its application he evolved the canoe.

12 It is by a continuation of the application of this same law that, almost within our own memory, it has been made possible for

the vessels of the world to be built of iron, something which the old shipbuilders thought impossible. We see then that it is the application of the personal factor that now makes iron float by the use of the very same law that makes it sink.

13 Upon a higher plane, the modern electric generator was evolved by observing that a wire passed at right angles through a magnetic field would induce an electric current to flow through it in a certain direction.

14 It was only by creating, through the application of the personal factor, conditions by which this law could be expanded that electricity was generated commercially. The electric generator is nothing more than a large number of such wires, insulated one from another, passing in and out of a number of magnetic fields, plus a device for collecting and conducting away the current generated. The important point to remember is that there never would have been an electric generator without the introduction of the individual personalities who literally created it.

15 In this connection it is well to observe that all of our creations, if they are to be successful, depend upon the strict observance of the laws of nature. When we clearly see man's place in the universal life movement we can understand why it was that in the long process of evolution it was inevitable that a being capable of measuring by reflection be evolved. The very word "man" is derived from an Arian root meaning to measure.

16 All this may seem at first sight far removed from the problem of "non-financial incentives," but it seems to me it is necessary before proceeding further to gain some conception of the reason for man's existence. The concrete illustrations of the operations of non-financial incentives will then have greater meaning.

17 Man, through the exercise of his intellectual faculties so laboriously acquired through ages of slow evolution, literally reflects the universal creative process upon the plane of the particular. There can be no organization of material substance except through an individual who can observe the laws inherent in the materials themselves. Then, by a process of reflection, these materials can be organized into forms which they could not take unaided by the individual will or a power external to themselves.

18 To state the matter more concretely: man, we know, cannot bring matter into existence, neither can he create the force which resides in the physical elements he uses in the day's work; what he does is to observe nature's forces in action and then, having learned

the laws, i.e., the reasons for their action in any particular direction, he seeks for means to make them express themselves more fully.

19 This, of course, necessitates the creation of conditions which do not occur spontaneously in nature. We have here the beginning of what we call the artificial and it is significant that the highest type of this form of creation, upon a higher plane than the natural, is termed art.

20 This creation of artificial conditions which, taken all together, we call civilization is of course the product of man's organizing power. While self-consciousness, the power of realizing the self as apart from the rest of the universe, has been a human faculty for untold ages before the present highly-organized state of society had been attained, it is nevertheless true that now, for the first time in the history of the white race, we are confronted with the problem of correcting the repressive or selfish character of civilization so that it will serve the mass of humanity. If we fail to accomplish this it will be destroyed by the same creative power which brought it into existence.

21 We must learn how to change the industrial environment from one which repels mankind to one which attracts. In other words, the incentive to work must be inherent in the nature of the work itself.

22 Now what are the conditions which we must meet in the industrial world to make work attractive? We have ample evidence that increasing financial returns have failed to stimulate productivity and, on the other hand, the constant demand for shorter hours and the increasing labor turnover is proof that work in most of our industries not only does not attract but actually repels the workman. We must therefore look into the working conditions themselves for the answer. This is the only scientific method of procedure.

23 I would like to quote from a letter received from a very intelligent labor leader recently,[1] to show how the mass of employees look at the problem and how urgent is the need for its immediate solution if we are not to have a greatly reduced production of the necessities of life brought about by the concerted action of the workers —

> Is it not true that the industrial evolution which has brought the trusts into existence has been the means of eliminating the "human touch" in industry? During the days of small industrial plants, the employer and the employee, of course, were really fellow-workmen. At the present time, however, the employee has perhaps never seen any of the stockholders of the industrial plant where he is employed.

[1] John P .Burke, Int. Pres., Pulp Sulphite and Paper Mill Workers Union.

You say that: Men can be productive only when they take an interest in their work and they will not take this interest unless those entrusted with the direction of their efforts realize that they must teach them constantly how to exercise their creative powers.

While I agree with everything you say relative to creative work and have thought along these lines considerably myself, still, is it possible in industries, as they are constituted at present, to enable the average workingman to do creative work? Isn't it true that industry is becoming so specialized that the workman is no longer a creator? I realize that while it may still be possible for the workman doing certain jobs in the mill to do creative work, to a certain extent, still isn't the tendency of modern industry more and more toward making the workman simply an appendage of the machine?

In the paper you sent me, you described how you designed a plan for the men operating the hydraulic press to take an interest in their work. This certainly is a practical illustration of what can be done, and perhaps could be cited as a refutation of what I have just written above. I realize that there may be certain jobs in the mill where the creative powers can still be allowed to develop, and that the workman may be given a chance to express his individuality, but the point I am trying to bring out is that the tendency of *modern industry* is away from creative efforts and gives the workman less and less opportunity for individual development. When I worked in the factories, which I did from the age of 12 to 25, one of the things I found the most dissatisfaction with was the deadening sameness of the work. I never remember a time, when working in the factories, that I became so interested in my work that I didn't long for quitting time to come. After leaving factory work I got a job with a building contractor. As I became more proficient as a carpenter, I have time and again been put doing certain work that was more or less creative, in which I have become so interested that I paid no attention to quitting time and have worked for two or three hours after the time when I might have quit work. There is joy in creative work. But, in my opinion, no matter what schemes we will try to devise, modern industry is going to tend more and more to make simply automatons of men.

I may say, however, that I could find very little to criticise in either of your articles. You have demonstrated, from practical experiments, things that I have often theorized about. The conflict in industry during the next few years, in my opinion, will be between the democratic and autocratic ideas. The autocratic idea, I think, is best exemplified by the German military machine.

24 I was able to convince the writer of the letter from which I have just quoted that creative work could be done to a great extent in modern industry, and, further, that this could be accomplished, without any radical changes in equipment, greatly to the advantage of both employer and employee.

INDIVIDUAL PROGRESS RECORDS

25 To do this, individual progress records are necessary so that the workman can know from day to day how he is improving in the mastery of the process.

26 The first example, illustrated by Fig. 1, is from that branch of the wood-pulp industry known as the sulphite process and shows

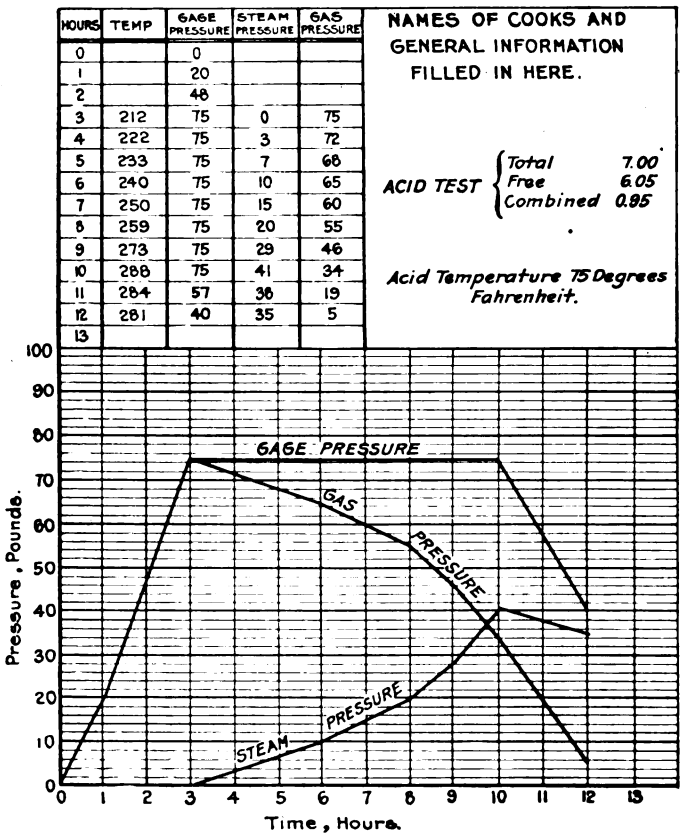

FIG. 1 REACTION IN DIGESTERS IN WHICH WOOD CHIPS ARE COOKED

a cooking chart which was designed to give the cook information about the reactions in the digesters in which the wood chips are cooked in a 6 per cent solution of sulphurous acid partly combined with a lime base.

27 The digesters have a conical top and bottom and are usually 50 ft. high by 15 ft. in diameter. After the acid and chips are put

into the digester and the cover is put on, steam is turned in at the bottom and the pressure brought up to 75 lb. per sq. in. above atmospheric pressure.

28 As this does not heat the digester sufficiently to produce disintegration of the wood, it is necessary to relieve gas through a relief valve on the cover. Because of the removal of this gas, which is afterward reclaimed, more steam can come in at the bottom and thus the temperatures are advanced. The skill in cooking consists in the proper control of the relief valve.

29 Before the introduction of these cooking charts illustrated by Fig. 1, all this was left to the unaided judgment of the cook with usually nothing to help him but a small hand thermometer and a pressure gage. Of course, great variation in the pulp was the result. The cooking charts, plotted by the cooks themselves, however, helped greatly as they enabled the quick visualization of the work. On these charts temperatures are converted to pressures for the reason that the pressure in the digester comes from two sources, one the natural pressure due to steam, and the other due to the sulphurous-acid gas. The pressure, for instance, which would correspond to a temperature of 212 deg. would be 0 or atmospheric, yet from the chart you will see that the gage pressure actually showed 75 lb. The difference between 0 and 75, therefore, is caused by the presence of sulphurous-acid gas. As the cooking progresses, the gas is naturally used up; first, by being relieved for the purpose of making room for more steam; second, by the natural combination of the acid with the organic compounds liberated during the cooking process.

30 At the end of the cooking process the gage and steam pressures will naturally come very close together as the greater part of the SO_2 gas has been used. The gas-pressure curve is obtained by subtracting the steam pressure from the gage pressure. It is really a resultant of the other two. If it drops too rapidly the cook knows he is relieving his digester too hard and checks the opening of the relief valve. If it does not drop rapidly enough he knows he must open the valve wider in order to increase the relief. Of course, the figures are taken from recording instruments which are checked daily to insure accuracy. Naturally, an ideal cooking chart was soon formed, being the joint work of the cooks handling the digesters and of the chemical research department.

31 Immediately after the introduction of these charts a very marked increase in the uniformity of the pulp was noticed, and the cooks, while at first opposed to the new method of "cooking with a

lead pencil" as they called it, soon learned to like their work much better for the reason that they now had some way of visualizing the work in its entirety. In addition to more uniform quality of the pulp, the yield from a cord of wood increased something over 5 per cent.

CONTINUOUS PROGRESS RECORD

32 We soon found that it was necessary to give some sort of continuous progress record if we were to keep up the interest in the work, because no man could carry in his mind anything but a general impression of his progress from day to day. Several good records for one day are only like so many good golf drives. They are a source of satisfaction at the time, but just as the score in golf denotes our real mastery of the game, so does the progress record measure the man's increasing mastery of his work, and we feel that it is one of the moral obligations of the management to keep such records for the individual workman. Without these records men will not think of improvements in the process and they cannot be blamed for becoming indifferent. How long, for instance, would a superintendent or manager retain his interest in the economical operation of his plant if his cost sheets were withheld? We, as executives, must have quantity, quality, and economy records, otherwise our interest soon lags. Why, then, should we expect the workman to be interested when he is not furnished with a record which at least reflects one of these elements?

33 Such records can be grouped, under three main headings: quantity records, quality records and economy or cost records. Quality records, which occupy the middle position, are, perhaps, of the greatest importance for they bring the individual's intelligence to bear upon the problem and as a consequence, by removing the obstacles to uniformity of quality, remove at the same time the obstructions to increased output. The creative power of the human mind is, however, not content simply to produce the best quality under existing conditions of plant operation. The desire to create new conditions for the more highly specialized working out of the natural laws of the process, demands expression and this expression at once takes the form of suggestions for improvements in mechanical devices.

34 This desire contains within it the germ of economic thought which will unfold and express itself eventually in a request for cost records, and the organization that neglects its opportunity to satisfy this desire is overlooking one of the great avenues leading toward intelligent productive effort

35 Because of the interrelation of quality, quantity and economy records, any complete record of individual progress must, of course, take them all into account. However, as this is not always practical we have at least one of three ways of measuring progress always open to us.

36 Table 1 shows how we keep a continuous progress record of the work which is mainly one of quality. By quality I do not necessarily refer to the quality of the material produced, as most of our records refer to the quality of the work performed; in other words, the nearness to which the workman approaches the ideal standards which he has helped to form. The democratic coöperative forming of these standards by the joint work of the trained technician and the practical workman is absolutely essential, otherwise continuous progress will not be made. The whole plan must be really educational in nature and to be so the records must record the natural laws of the process and the individual's degree of control of forces in the material elements that he is using. The more factors that can be recorded, the greater the interest in the work. The reason for this is obvious.

37 Referring again to Table 1, it will be noted that there are nine men cooking. These men are posted in the order of seniority, with the highest monthly record on top. There are three foremen at the top of the record. Each of these foremen has three cooks under him and their standing is made up by taking the average records of the men under them. In this way we are enabled to get not only the individual records of the men, but the group, or team-work records, as well. The lower group is merely for the convenience of the department head in charge and gives the relative standing of the large, medium, and small digesters. This is irrespective of the men who are working on them.

38 The total progress record figures in the first column are made up of the temperature, color, time and blowing records. The relative values that these have in the total record are shown at the top of each column, the total adding up to 100. The small variation in the monthly average column is characteristic of all our progress records, and shows how great is the incentive when individual effort is intelligently recorded.

39 The temperature record is obtained by taking half-hourly readings from the recording-thermometer chart, upon which a standard temperature curve has been plotted, calling each reading which happens to fall on the standard line 100, and a reading 20 deg.

TABLE 1 RECORDS OF INDIVIDUAL COOKS

Date, June 2, 1916.

Name	Total Progress Record		Relative Value 50		Relative Value 35		Relative Value 10		Relative Value 5		General Information					
			Temperature Record		Color Record		Time Record		Blowing Record		Average Maximum Temp.		Average Test 5th Hour 1.25		Average Test 6th Hour 0.80	
	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.	Daily Avg.	Mo. Avg.
Myler	88.2	88.3	84.8	85.9	99.3	98.3	90.6	88.6	58.8	59.5	293.6	294.7	139	134	100	103
Duggan	86.2	87.7	81.8	85.1	96.4	97.7	95.3	91.9	59.2	60.8	299.0	298.5	134	133	96	95
S. T. Ellis	85.8	87.1	79.1	83.2	98.8	97.7	95.1	93.8	57.9	59.7	299.8	299.6	125	129	101	102
Rodgerson	86.7	89.3	83.3	88.2	99.2	99.0	92.5	88.8	64.3	62.1	296.2	294.7	161	134	105	103
J. P. Ellis	89.5	88.7	87.2	86.8	96.7	97.7	96.7	94.8	56.3	62.0	294.7	297.2	123	129	94	96
McKee	88.8	88.3	84.8	86.0	100.0	98.9	90.5	90.0	56.4	59.9	294.4	294.7	132	133	96	101
Teeling	88.0	88.2	84.2	85.9	100.0	98.5	92.8	90.7	62.0	61.0	299.5	298.3	128	135	91	104
McKelvy	83.1	87.1	77.1	84.4	96.0	97.8	93.3	89.0	62.0	60.5	204.3	298.8	122	129	96	97
Element	84.9	87.2	79.1	83.8	96.7	97.7	95.2	92.2	59.3	59.9	297.8	299.7	130	131	98	95
McLean	83.9	87.2	75.3	81.9	98.8	99.1	97.8	93.3	59.2	57.8	306.4	302.1	137	134	109	102
Johnson	85.4	86.4	77.9	82.2	97.5	96.1	94.4	97.0	52.3	60.2	294.5	296.3	136	131	102	101
Neil	89.2	86.1	89.2	86.1	86.3	83.7	98.8	96.8	54.6	56.3	289.3	294.4	130	133	100	105
Large	86.6	87.4	82.0	85.5	98.5	98.3	91.9	87.0	59.8	59.9	299.0	296.4	129	133	95	100
Medium	87.2	87.9	83.3	85.7	98.5	97.7	94.9	91.8	58.6	61.6	298.2	296.9	134	132	99	99
Small	85.9	86.5	80.1	83.1	98.2	97.9	94.9	88.3	57.6	58.3	298.4	299.3	131	133	102	100

either side of the standard line 0. This means that for each degree off of the standard, 5 points are deducted from the progress record.

40 The color record indicates how near the men come to blowing the digester when the color of the liquor shows the proper amount of lignine in the solution. The sample, drawn from the side of the digester, is compared with the standard color. To get a mathematical value for this factor a range of colors from a very dark to a very light was obtained, the particular shade which was taken as standard marked 100 and one shade either side 10 points less than 100.

41 The time record is obtained by calling a certain time of cooking 100 and taking off on each digester cooked one point for each minute above or below this standard.

42 The blowing record is obtained by calling 30 lb. pressure 100 (most of the cooking being done at a pressure of 75 lb. per sq. in.) and 60 lb. 0, the idea being to get the pressure as low as possible before blowing the digester.

43 It will be noted that the temperature value is higher than any of the others. This is because it is the most important element. The color record coming next in importance is given the next highest value, etc.

44 By an arrangement of this sort, by simply changing the relative value of the different factors, it is possible to emphasize any particular phase of the work. The men willingly pay the greatest attention to the factor that has the greatest value because it gives them the better record and because they know the reason for the change. For instance, if it is desired to emphasize quantity, we give a larger value to the time record and a lesser value to the temperature record. Production is then somewhat increased at the expense of quality.

45 While I could give many illustrations similar to the one just given of our cooking operations, I will give only one final illustration of how economy progress records meet with equally great response. In the plant where this system was developed were employed over 1200 men and perhaps half of these men had individual progress records and the rest came under some sort of group-progress record. Invariably the records proved themselves to be an incentive to greater productivity.

COST RECORDS OF WORK

46 Below is shown a foreman's detail job sheet which indicates the method we had for giving our maintenance foremen cost records of their work. It is obviously a difficult matter when dealing with maintenance and construction work to give quality or quantity records as the work varies so much from day to day, so the only kind of records we could give the men were records of cost. The original suggestion to give these records grew out of the fact that we gave to each operating department head a complete cost of operating his

FORM NO.8

FOREMAN'S DETAIL JOB SHEET.

Job 2771 Foreman John Laffin Date 1/10/16

Name of Job Install 2-35 Hp. Motors on Coarse Screens in West Mill.

Description Electrical Dept.-Power Wiring.

Date Started 1/7/16 Worked on 4 Days

Labor Cost to Date	31.6
Material Cost to Date	7.38
Total Cost to Date	38.54
Labor Cost Yesterday	0.80
Material Cost Yesterday	6.41
Total Cost Yesterday	7.21

DETAIL OF MATERIAL USED YESTERDAY.

ITEMS.	PRICE.
2-1½" Long-Turn Elbows,	0.51
4½ lb Solder,	1.23
4-1½" Type E Condulets.	2.02
4-1½" 4 Hole Porcelains,	0.64
1 Roll Oiled Lined,	0.24
1 Roll Friction Tape,	0.11
16-100 Amp. Terminals,	1.66
	$6.41

FIG. 2 FOREMAN'S JOB SHEET

department for which he was held responsible. As soon as he began to realize this responsibility, because all the repair materials were charged to him, he at once began to make intelligent criticism of the engineering department, and especially was he critical of the maintenance foreman if he was wasteful in the use of materials. As a result of this, the maintenance foremen asked the master mechanic if they could not have job costs showing how economically they were doing their work as they had no idea of the value of materials that they were using. The foreman's detail job sheet shown is the result of this request. It will be noted that the job is fully described, the total

cost for labor and material to date is given, as well as the cost of labor and material for yesterday. Then below is listed the itemized cost of all materials used. The men soon became educated as to the value of the materials they were using and we noticed a great change in the amount of waste; in fact, we had frequent cases where maintenance foremen would bring scales into the mill to make sure that the storehouse was giving them full measure of materials and we were soon

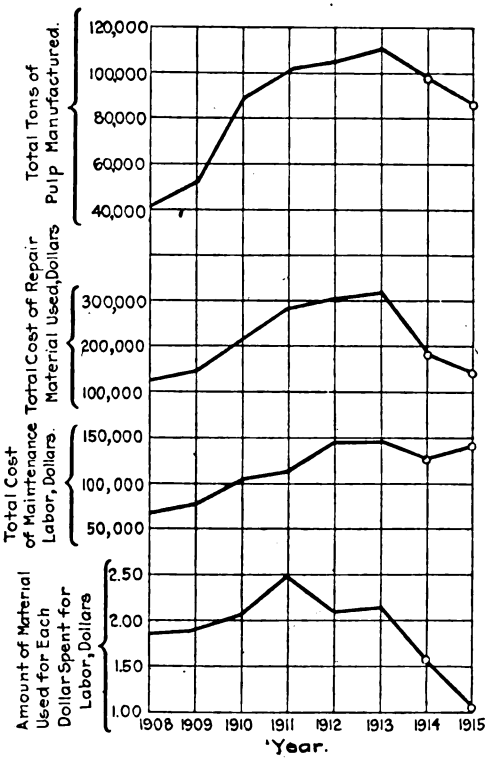

FIG. 3 SHOWING CONCRETE RESULTS OF COST SHEETS

obliged to get up a system of giving credit for material returned to the storehouse in order to help foremen keep down their job costs. This was in no sense a form of contract system, for all of our maintenance and construction men were paid by the hour and did not receive any more money for doing a job economically.

47 Fig. 3 shows the concrete results obtained by giving the cost sheets to the department heads and job costs to the maintenance

foremen. It will be noted there was a rapid increase in production from 1908 to 1913, also a rise in repair material used as well as an increase in the cost of maintenance labor. The fourth curve, showing the amount of material used for each dollar spent for maintenance labor, is more or less a resultant of the other two. The gradual rise from 1908 to 1911 in this curve was due to the increased material-consuming power of the maintenance men because of the introduction of labor-saving devices, such as pneumatic and electric portable tools. There was a drop in this figures in 1912 and 1913 but we were unable to get a real thought of economy started in the plant until the departmental cost sheets and job-cost sheets were started. These were put into effect first in the beginning of 1914 and there was an immediate drop in the curve from an average of about $2.15 worth of material spent for each dollar spent for labor, down to $1.55 in 1914 and $1.05 in 1915.

48 That this drop is due to the greater economy and thought in the use of materials is indicated by the fact that our maintenance crew was not very much reduced, the saving coming almost entirely in the use of materials.

49 The drop in production in 1914–15 was due to war conditions which were unavoidable. It is a significant fact, however, that in spite of this drop in production the maintenance material cost per ton of pulp was reduced to approximately half the amount under the conditions of higher production during the two preceding years.

50 In none of this work did we pay bonuses to a superintendent, department head or workman; our salaries and wages were high, but payments were all on a monthly, weekly, or hourly basis. The increased effort therefore came entirely from a desire within the individual to be productive. Of course this sort of creative effort produced great changes in operating conditions; we increased our yearly production from 42,000 tons to 111,000 tons without adding to the number of digesters for cooking the pulp, or wet machines for handling the finished product and we changed our quality from the poorest to the very best.

51 Due to the intelligent suggestion which came from our men all over the plant we were able to make very radical changes in the manufacturing processes. Entirely new methods of preparing our wood, making acid, bleaching, etc., were created, all of which we paid for out of the earnings.

52 I maintain that this was all the result of the freedom our men were experiencing because they were working in an environment

which stimulated thinking. They had ample opportunity constantly to increase their knowledge of the underlying natural laws of the process, and were therefore able to realize the joy which comes from a conscious mastery of their part of the process.

53 This freedom to express one's individuality in constructive work according to law, is the only real freedom, for freedom unrestrained by a consciousness of the universality of natural law leads to anarchy.

54 We should never lose sight of the fact that the degree of conscious self-expression which the workman can attain is in direct proportion to the ability of the organization to measure, for his benefit, the impress of his personality upon it. The most democratic industrial plant, therefore, is the one which permits the fullest possible amount of individual freedom to each member, irrespective of his position and at the same time is so sensitively adjusted that it reflects immediately the effects of his actions. If his actions result in injury to others he will see that as a part of the whole he, himself, must also suffer.

55 I have made no attempt in this paper to touch upon our method of arriving at the proper financial compensation as this is beyond the scope of the subject assigned to me. I feel that I should state, however, that in our mills in Canada, where the same scientific recording of operations is being developed, our wage rates are adjusted each spring after careful discussion with the representatives of our local labor organizations. This has proved to be a very just and satisfactory method, for the rates thus determined are really a consensus of opinion of both employer and employee and once the wage question is disposed of, all are free to devote their energies to the intelligent solution of manufacturing problems. Constant agitation of the question of financial renumeration only detracts from the work, and our experience has invariably been that there will be plenty of incentive to productive effort if the working environment is such that the workmen can express himself as an intelligent human being.

56 Man is not an animal, but a free, self-determining mental center of consciousness whose reason for existence is that the universal life can deal with a particular situation in time and space and, by this means, be enabled to evolve a material universe organized to express the one great individual life of which we are all a part.

57 In conclusion, let me say that I am well aware that to some of you this may seem like pure philosophical speculation far removed from the practical affairs of every-day life. I have said nothing, how-

ever, that I cannot back up by any number of additional illustrations, and my hope is that the examples given will stimulate others to make similar investigations, so that we can fulfill our mission in this country by evolving an industrial philosophy which will have for its ultimate aim the continuous unfoldment of the latent powers in man.

DISCUSSION

WALTER N. POLAKOV, who opened the discussion, said that the impression should not be gained that financial incentives are not important or even superfluous as long as non-financial incentives are at work. To illustrate his point he showed on the screen three charts dealing with fuel losses in a power plant. In the first chart, with neither financial nor non-financial incentives at work, the loss amounted to over 30 per cent. In the second, with non-financial incentives only, the loss had been reduced to 17 per cent, while in the third, with both financial and non-financial incentives, the preventable losses had been wiped out. The type of chart employed by Mr. Polakov is that shown in Fig. 2, page 718, *ante*.

W. E. PULIS, who followed Mr. Polakov, showed two slides dealing with the increase of production in a shop brought about by the introduction of financial incentives.

IRVING A. BERNDT [1] wrote that he was particularly impressed and in accord with what Mr. Wolf had said concerning the necessity of providing workers with environments which attract, and providing incentives inherent in the nature of the work itself. This was fundamental and basic. Were he to add any thought to this, it would be that the responsibility for this lay with the individual employer, manager and executive and should under no circumstances be passed on to society or to the worker himself. To show how large the non-financial incentive bulked in the production problem, Mr. Berndt enumerated twenty-four factors and ten methods which influence industrial relations, of which but two factors and one method had to do with monetary reward.

Being at one time confronted with the problem of reducing supplies taken from storerooms in a large plant — supplies used for maintenance and repair — Mr. Berndt found it possible to secure

[1] Care of C. E. Knoeppel & Co., 6 East 39th St., New York City.

interest among the men calling for them by placing at the storeroom window a list of current prices and a weekly bulletin telling how much the supplies used by each man or group had cost, comparisons being given. The two simple records stimulated interest and the desired result was secured. He had never found a foreman who was unresponsive to confidence placed in him by showing him records of costs, performances and even profits. He would not consider a monetary incentive properly applied unless it included a plan for keeping each man advised of current progress and also giving him a written statement of results.

HENRY L. GANTT said that the paper was an important contribution because it emphasized democracy in industry, and also that there could be no democracy in industry unless there was common knowledge of what was going on. Mr. Wolf had obtained remarkable results by letting every man know what he was doing and what was expected of him. The discussions of Messrs. Polakov and Pulis had indicated what could be accomplished when it was known exactly what men should do and when they were shown how to do it and paid a premium for doing it.

To know in advance how much each man should do of his various tasks, to know afterward how much he did do and to find the reasons why more had not been done, was not very easy, but it could be done in most cases. In many shops, however, it was not known how long it should take to perform the various operations or even the sequence in which they should be performed. He had found that incomparably better results were obtained by helping the slow and incompetent men to learn rather than by speeding up the man who was already fairly efficient.

In settling the problems confronting the employer and employee each concern was going to lay a foundation for harmonious coöperation by learning more about the conditions in its own shop and what there was that was hampering its workmen.

RICHARD A. FEISS thought that there was danger of interpreting Mr. Wolf's paper as a condemnation of financial incentives. Both financial and non-financial incentives had their place and must be taken into consideration. There were no cure-alls in industry, and failures in the application of so-called efficiency methods had grown out of a loss of perspective. The object, after all, was to obtain the best possible result from the human element in industry, and that

involved a psychological question. The problem of employment would be solved only by maintaining a broader vision, by remembering that the human being is a human being and must be studied from all points of view and under varying conditions. Mr. Wolf's paper had called attention to but a single element in management and it, with all the other elements in a given case, must be taken in consideration, remembering that man was a complex psychological as well as physical being.

A. L. DE LEEUW said that the lasting growth of labor could only be caused by making labor develop from the inside out. The effort must be made by the laboring man, and not by the employer. The employer had only helped labor in general, but had not caused it to grow. Labor had taken the stand that it could grow only by antagonizing the employer, who, at one time, had held this same view regarding labor. Something should be done to make labor start developing itself in the proper direction. If labor had not already seen these facts, should not some one hold out the hand and invite labor to move in the right direction? Had not the time come when the engineer should get in touch with labor and invite it to discuss economic questions from a standpoint of pure and simple engineering, dropping all ideas of malice, and presenting the idea that a true bargain is one which benefits both parties? Should there not be a third party more or less disinterested, or, rather, interested in the welfare of both, who would hold out the hand to labor and invite it to develop itself, to make an organic growth from the inside outward? Would it not be well if some engineering society were to invite labor into its counsels and see that a proper organized effort was made to have it look at the question not only of its own development, but of the development of industry as a whole, and so bring labor to realize that no real benefits can ever come to it and be lasting unless similar benefits come to the industry as a whole?

CHARLES WHITING BAKER pointed out the necessity of keeping up the volume of demand so that every workman might be employed, and that this could only be done by bringing down prices to where the people here and in Europe could buy. The industrial situation would have to be treated as a whole and if labor could be made to realize that raising wages by specific industries helped but little and that they would have to be reasonable in their demands so that prices could be sufficiently lowered, then it would be possible to get somewhere in the solution of this great problem confronting the country.

HUGO DIEMER said that to understand the economic principles underlying demand and consumption meant that the worker, the engineer and the general public must be educated. It was frequently stated that the engineer's viewpoint was narrow by reason of his not having given attention to the human phase of the situation. A course in Industrial Engineering given at The Pennsylvania State College for a number of years had been planned to remedy this in some measure. There students are given instruction in cost accounting and time study and devote considerable time to the study of labor, welfare and other industrial problems.

JOHN CLINTON PARKER said that the $30 a month the soldier in the war had received was certainly no financial incentive to him. He would define the non-financial incentive as being the same as that which prompted those who competed in sports or strove otherwise to win an honor or prize — that which impelled them to creditable performance.

FRANK B. GILBRETH spoke of the changed conditions confronting industry with the close of the war. Where a soldier was returning to his former job, held by some one whom he considered his inferior as a mechanic, he found that more output had been accomplished than he had been accustomed to do, and that greater productive effort was to be required of him in the future. So true was this in Europe that it had resulted in the elimination of practically all restrictions upon the size of individual outputs. The realization had now come that the financial success of a country depends upon the size of output per individual worker. Engineers and economists had known this fact for a long time, but many workers had not. They had held an honest belief that restricted output was the one thing which assured a job for every man. They were not going to believe this any more because the labor leader now knew that it was not true. Further, the worker henceforth would not only release all limitations upon output but would use his craft knowledge and skill to increase output. The workingmen's committee had been operating in a number of places as yet unannounced and with remarkable results. They were not interfering with the management in obtaining intensive outputs but were working on such things as the regulation of heating and ventilating, reduction of labor turnover, the selection and placement of the right man for the right place, fatigue elimination, education and corporation schools, and in some of the more advanced instances in

the motion-study laboratories for determining the One Best Way to do work.

While non-financial incentives that would cause the workers and employers to coöperate should be fostered, it must be ever borne in mind that the financial incentive is the cause of *maintenance* and *permanency* of coöperation and it should be large enough by itself alone to maintain the state of hearty coöperation through and past the reign of the malefactor.

ARTHUR C. JACKSON drew attention to the law that investment is entitled to an income. This investment might be in any of the following forms — cash, invention, accumulated earnings, or the results of the continued services of an employee. There should be a standard way of measuring all of these investments and it is the duty of the engineer to solve the problems of the fair division of the profits resulting from these investments. Wealth is not alone measured in money, but in the end in production. This country must continue to be an exporting nation and also an importing nation if it is to maintain its position among the countries of the world. We can only maintain a wage scale above that of our competitors by the proportion that our production exceeds the production of our competitors, either in quantity or quality; and this can best be done by the careful development of true coöperation by employee and employer. This coöperation could best be obtained, in his opinion, by the worker's being allowed a share in the management and in the profits.

OBERLIN SMITH, commenting on the law forbidding the use of stop watches and time studies in Government arsenals and navy yards, said that while congressmen and labor leaders were in the main well-meaning and patriotic men, they nevertheless needed to be taught the true nature of scientific management, as their actions showed they did not understand it. Whether the combined engineering societies could do anything in the matter was a question to consider. Hence the desirability of electing men of the engineering fraternity to both houses of Congress, which important bodies are now almost entirely lacking such a personnel.

ARTHUR L. WILLISTON felt that the interest stimulated in an employee by teaching him how to perform his job properly would begin to lag after the attainment of the desired degree of perfection became an old story. He considered that the employer should have

a new and greater lesson to teach as the simpler ones were mastered, looking upon his workmen as progressing from stage to stage in his industry as students progress in college from one class to another.

SPENCER MILLER said it would seem that the author had contradicted himself in stating that men were rewarded by promotion and that the incentives were at the same time non-financial. He was very certain that there would be no conflict between capital and labor provided those involved comprehended that whatever stood for the idea of might would be defeated because public opinion would be arrayed against it. Public opinion in America was thoroughly united for righteousness, and if that could be finally kept in mind along with the fact that every human being would respond to it, then there would be no difficulties and the period of reconstruction would be passed through without strife. He proposed a vote of thanks from the Society to Mr. Wolf for having brought out so clearly in his paper the growing amity between capital and labor, which was unanimously adopted.

ROBERT L. SACKETT spoke of the increasing movement toward offering opportunities for instruction to the employee. This, he thought, was a form of non-financial incentive in spite of the fact that improvement on the worker's part would probably lead to increased compensation. In Pennsylvania alone nearly 5000 men had received instruction during the previous year in regularly organized classes, and in over 50 per cent of the cases the students met in the industrial establishments where they were employed. Aside from its value from the educational standpoint, this movement was finely effective in bringing employer and employee into closer sympathy. There was a real growth of appreciation in technical schools of the desirability of giving instruction in the humanistic side of engineering, and quite a number already included such instruction in their curricula.

THE AUTHOR in his closure, said that in his plants there was little consciousness of antagonism between employer and employee — all were fellow-workmen. He had secured the spirit of coöperation with his employees by appealing to their intelligence and sense of justice, adjusting their wages by conferences, etc. The men were promoted throughout the plant in much the same way that men progress through an educational institution. In his opinion there would never be any trouble with labor if the employer went to labor in a frank spirit of

open coöperation. Moreover, he believed labor leaders were beginning to realize that the workman must stop focusing his entire attention upon the distribution of wealth and focus it mainly upon the production of wealth, and that then the desired compensation must inevitably follow.

In reply to Mr. Polakov, he said that the reason his non-financial-incentive records did not show as great a saving as when a bonus was attached was because the plan of giving the men the record of their accomplishment without the bonus attached to it had not been properly tried out. Without deprecating bonuses entirely, he was of the opinion that they should be carefully considered. Men (both union and non-union) had said to him, "We don't like to be bribed to do a good job. We would like to have the privilege of doing a good job without being baited to do it."

Referring to Mr. Miller's comments, he said that he by no means deprecated the value of financial incentives; nevertheless, men did not do their best work for money. It was the record, the accomplishment of the man that counted, and it was fundamentally self-expression that the man wanted. The financial reward was bound to follow, and the employer who gave a man a chance to use his brain power and did not give him the financial compensation that went with it, was doomed to failure.

Regarding the disposition of the saving due to the improved efforts of employees, he was of the opinion that the money should be divided in proportion to actual earnings, that the men should be part owners of the industries. It had been because workers had not worked intelligently that employers had been able to deprive them of this division of profit. The employer had used his brain to exploit the employee; and the employee had countered by organizing his against the employer. That employee must be encouraged to use his brain for productive work. Then he would see to it as his mental capacity increased that proper reward followed.